EDP industry report and market review

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EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"The Gray Sheet"

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MOLLY UPTON, EDITOR APRIL 14, 1982 ● VOL.17, NO.24 P.J. MCGOVERN, PUBLISHER

IBM ENDORSES FIELD UPGRADES, EXTENDS 308X SERIES DOWNWARD; UNIPROCESSOR VERSIONS MARK THE END OF 303X ERA

"With the introduction of the 3083, the advanced technology 308X family provides the greatest span of field-upgradable, non-disruptive growth ever offered by IBM." -- from IBM Product Announcement

Now that IBM has blessed the concept of CPU field upgradability, an era of interchangable computer components, the so-called nameplate generation, may finally be arriving. Though no one can make much sense out of IBM's processor numbering system, the fact that users can go from the new 3083 series up to the 3081K in eight hours signals IBM's new commitment to modular packaging.

The only significant difference between the 3083s and the 3081K is that the new machines are uniprocessor as opposed to dyadic. They use the same thermal conduction module technology, have the same 26 nanosecond cycle time, and are sold in the same box. Upgrades appear to be a mere matter of swapping boards.

In terms of price/performance, the new 3083 models E, B, and J, fail to live up to either the 4300 series or the 3081K announced last October. They are a slight improvement over the 3081D which cannot be easily upgraded to and already is appearing to be the lame duck of the family. But the ho-hum internal performance data masks some other rather significant details, among them:

- The four year old 3033 (U,A,M) series is officially obsolete, although still in limited production. 3033 prices have been cut once again, this time by 15%-17%.
- The new machines do little about the processor gap between the 4341-2 and 308X series, leaving the 3033S as a weak option.
- All three 3083 models can be air-cooled, but choice of air cooling cuts off the user from the water cooled 3081s.
- The 31-bit addressing feature (System/370 Extended Architecture, aka MVS/XA) is available on all three members of the 3083 series.
- PCMs are holding their ground; NAS says no price changes expected, Amdahl still evaluating.

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IBM 3083 CONFIGURATIONS AND AVAILABILITY

Model Group	Memory (MB)	Channels	Larger than 8MB and/or 8 channels	8MB and/or 8 channels	IDC Rating
3083E	8,16	8,16	2Q 1983	2Q 1983	185
3083B	8,16,24,32	8,16,24	1Q 1983	2Q 1984	277
3083J	8,16,24,32	8,16,24	1Q 1983	2Q 1984	370

With the exception of the air cooling option, nothing about the 3083 hardware comes as much of a surprise. EDP/IR has learned that the 3081K consists of two 3083J's but contrary to many reports the 3081D does not consist of two 3083B's since the thermal conduction modules on the /D contain 118 chips and those on the other "H" machines have 133. Thus /D to /K upgrades take from 14 to 28 hours. By adding a second /J, the user gets 80% increase in power; large models of the /B and /J will be available more than a year before the smaller configurations. As with the 3081s, memory is $25,000 per megabyte.

Although the processor upgrades can be done in a day, increases in main storage take approximately 18 hours; if this upgrade includes going to a different model the total time will be somewhat less than the sum of 26 hours. IBM's upgrade pricing indicates that users will not be penalized for buying small and upgrading later. The upgrade schedules are listed below.

Model Group	Time	Price	Availability
3083/E to /B	5 hrs	$700,000	3Q 1983
/B to /J	5 hrs.	$600,000	3Q 1983
/J to /3081K	8 hrs.	$1,600,000	4Q 1983
3081/D to /K	14-28 hrs.	$600,000	3Q 1982

4300 vs. 308X, where will they meet?

Still unresolved is where IBM will draw the line between the 4300 and 308X series. The 3033S is not attractively priced (see price/performance chart) and has met with limited success. IBM has had the luxury of time since the PCMs have not been particularly aggressive in this niche either. NAS's 7000 line is best positioned to compete in this arena, and NAS is expected to come out with a new line beneath the 7000 series that will compete with the high end of the 4300s.

Perhaps IBM has not decided how far down the product line it wants to push the 31-bit addressing features. International Data Corporation, publishers of EDP/IR, believes that existing 4300 technology is not sufficient to bridge the full gap without going to a multi-processor version. It thus believes that there will be both a bigger 4341 (presumably a 4351) as well as a smaller 3083 that will have approximately twice the performance of the 4341-2.

The air vs. water controversy

A 3087 Coolant Distribution Unit Model 2 offers 3083 users an air cooled option. The move will give existing air cooled 370/148, -/158 and 3031 users (representing more than 3,000 machines) an air-based migration path, and it will help compete with air cooled PCM sites who are going after the same 148/158, 3031 base. Since IBM still maintains that water cooled systems are more efficient, the move does not seem to signal any major trend.

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CURRENT PRICE/PERFORMANCE, IBM CENTRAL ELECTRONIC COMPLEX
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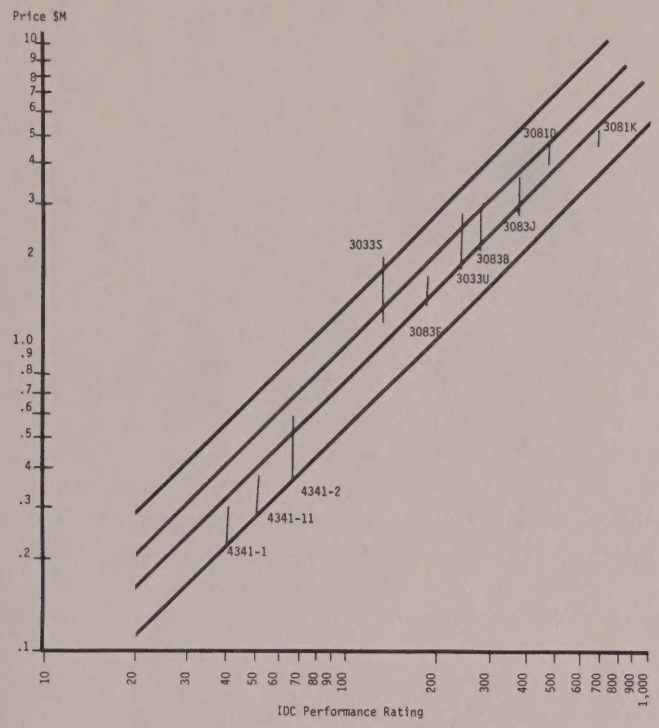

But the air-cooled path has one drawback. In order to be able to upgrade to 3081 machines, users must have water cooling capability. Apparently the extra circuitry of the dyadic processor system will not allow for an air cooled 3081, at least not yet. Additionally, some of what the user saves on plumbing costs will be offset by 20% higher costs of the $72,000 air cooled 3087 Model 2 Coolant Distribution Unit compared to the $60,000 water cooled Model 1. Rental and lease prices on Model 2 are nearly 50% higher than for the Model 1.

Future directions

For those not impressed by the 3083's price/performance, IBM has let it be known that in the future instruction rates will not be an adequate means to compare CPUs; newer software and design features will bring their own efficiencies. In the words of the 3083's Blueletter:

> *"As new releases of operating systems supporting new architecture and function become available, the absolute instruction execution rate may change. It may well happen that the instruction execution rate will decrease even though throughput may continue to improve. In most cases the instruction execution ratios should remain constant between 3081 and 3083 processors."*

IDC believes that there are two likely means to achieve such improvements: if new instructions are added that offer substantially increased functionality for each instruction (i.e., the hardware implementation of operating system and data base manipulation functions; or if a new instruction set is introduced supporting an address space of more than 31 bits, allowing for longer instructions and larger displacement fields.

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CURRENT IBM/PCM PRICE/PERFORMANCE DATA
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Model	Memory	Channels	Price	IDC Perf. Rating	Available	Cooling	$/Cupal*
4341-1	2	3	225,000	40	4Q/1979	Air	5,625
	4	6	274,190	40			6,854
4341-11	2	6	275,000	50	1Q/82	Air	5,500
	8	6	369,200	50			7,384
4341-2	2	6	359,000	66	2Q/82	Air	5,439
	16	6	578,800	66			8,769
3083-E	8	8	1,350,000	185	2Q/1983	Air/Water	7,297
	16	16	1,700,000	185			9,189
3083-B	8	8	2,050,000	277	1Q/1983	Air/Water	7,400
	32	24	2,950,000	277			10,649
3083-J	8	8	2,650,000	370	1Q/1983	Air/Water	7,162
	32	24	3,550,000	370			9,594
3081-D	16	16	4,000,000	465	4Q/1981	Water	8,602
	32	24	4,550,000	465			9,784
3081-K	16	16	4,600,000	675	2Q/1982	Water	6,814
	32	24	5,150,000	675			7,629
3033U	4	12	1,800,000	237	2Q/1978	Water	7,594
	24	16	2,780,000	237			11,729
Amdahl V7C	8	8	1,150,000	120	3Q/1981	Air	9,583
	16	16	1,750,000				14,583
Amdahl V8	8	122	2,075,000	310	3Q/1979	Air	6,690
	16	16	2,525,000	310			8,145
NAS 7000N	2	6	950,000	105	2Q/1980	Air	9,047
	8	8	1,300,000				12,380
NAS 9000	12	16	2,750,000	393	1Q/81	Air	6,997
9000N	4	6	1,995,000	314		Air	6,353

* Calculated by dividing purchase price by IDC's performance rating.

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Whereas in the past IBM has given specific information to explain variations in different model's performance (cache size, instruction pipelining, etc.), all IBM has said about the three new machines is that the improved performance of the B and J over the E is due to "more overlap and more effective processor organization." Cache details are not being published.

Curtain call for 3033

As evidence of the ever-shortening product cycles, the IBM 303X series spent a good part of its four-year active life waiting to be superceded by the vaunted "H" series. With the announcement of three mid-range machines, that time has come, and though "H" is not proving to be a price/performance bombshell, the upper-end 3033 U/A/M/N models are now officially obsolete.

The 3083 series makes a direct hit on the 3033 U/A/M series. With IDC performance ratings of 185, 277, and 370, it starts a little below the /U's 237 and falls just short of the /A's 405. The 3033N was obsoleted last October, when IBM allowed 3033S users to upgrade directly to the /U. The /S hangs onto a viable but unexciting position, as shown by IBM's decision not to lower its price. By cutting 3033U prices an average of 17%, IBM has brought the 3033U into the top part of the price/performance band of the new 3083's.

But IBM has not abandoned its existing 3033 users. Significant price cuts for model upgrades and optional channel groups have been announced. Additionally, four "performance packages" of optional features and RPQs are being bundled and sold at a discount. Among the features are the 3033 Extension feature, and extended control storage and data streaming, the modifications that allow two 3033 channels to operate at 3MB/sec.

IDC estimates that at the end of 1981 there were some 1,300 IBM 3033 size machines installed in the U.S. Over the last 18 months IBM has repeatedly slashed 3033 prices, and since its March 1978 introduction prices have fallen by some 50%. Despite IBM's best efforts to entice 3033 purchases, over half of these machines are being leased.

PCM response

Though IBM has cut into the traditional PCM price/performance edge, both Amdahl and National Advanced Systems are trying to hold their ground. Amdahl's motivation seems obvious. Given that it has already announced substantial declines in expected earnings because of late 5860 deliveries, major price cuts on bread-and-butter lines like the V/7 and V/8 are something the company hopes to avoid. NAS says it thinks its 9000 line will hold up well against the 3083. But as the chart on page 4 shows, PCMs claims of "more for less," though still mostly valid, are feeling a little bit of a squeeze.

Numbering confusion

Hopefully the 308X family has been better planned than its numbering sequence. Not only is the 3083 a smaller machine than the 3081, reversing a time worn IBM policy, but the alphabetical order is also indecipherable. Thus we have the 3083E larger than the 3083B which is smaller than the 3083J. In short, neither numbers or letters correspond to size, leaving only the user's memory to unravel inter-product relations -- not an auspicious start for a product that will be around for the better part of the 1980s.

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NEW DESKTOPS PROMISE MORE POWER AND INTEGRATED FUNCTIONALITY

The desktop market is still young enough for many new vendors to enter with clean technological slates. But through the steady stream of new vendors, EDP/IR sees three -- Grid, Fortune, and CIE Systems -- that, like Convergent Technologies and Apollo Computer, are offering minicomputer power via 16-bit microprocessors coupled with high level software interfaces.

Grid Systems has already made a media splash. Headed by John Ellenby, former manager of advanced programs at Xerox's Palo Alto Research Center and with key people from Tandem and Apple, the company has received $12 million from venture capitalists and celebrities such as Gene Amdahl and Ben Rosen.

Grid's Compass Computer can rightfully boast of a unique combination of portability and power. Within the space of half a briefcase, Grid has packed a Sharp-made, bit-mapped high resolution 4.75" x 3.5" flat electroluminescent screen, 256K of RAM, 256K of fixed bubble memory, a quality 57-key keyboard, built-in 300-1,200 bps modem, a 16-bit 8086 microprocessor and an 80-bit 8087 arithmetic (floating point) processor. The whole box weighs 9.25 lbs.

IBM communications are strong with asynch, bisynch, SNA, 2780, 3780, 3741, 3275, and 2770. Grid will distribute software and provide extra storage and electronic mail through its Navigator System, which consists of centrally located, Grid-owned Series/1s. Compass Central, an 8086-based controller with IEEE 488 interfaces offers local networking for shared storage and peripherals.

On top of this comes a new set of software tools. Grid's philosophy has been to base all applications on a standard set of commands -- what Grid calls "leveraged learning." Grid is providing five key tools: Gridfile, a relational data base with data entry and querying functions; Gridplan, a spread sheet tool, Gridwrite for word processing, Gridplot for graphics, and Gridpath for project management. Data is interchangeable between functions, eliminating the need for rekeying. Grid uses a Unix-like operating system that supports Pascal, Fortran 77, PL/M, C, and Basic. The system is very user friendly.

Grid's problems are likely to come on the marketing/strategy side of the business. The company has put a heavy emphasis on portability that has forced them to go with a small screen. Because of its high density, it can show 70 characters per line, and scroll to 256, but the small tightly-packed screen is not especially conducive to the spread sheet analysis many managers desire.

In addition, at base price of $8,150 (not including printers or auxillary storage) Grid may find itself in the same "tough sell" position as the Xerox Star. Somewhat surprisingly, Grid has chosen to sell direct, eschewing both retail stores and systems houses. Its target base is Fortune 1000 users who might be looking at the IBM Personal Computer (PC). Whether these people will be willing to snub IBM and pay for Grid's power, functionality and portability remains to be seen. EDP/IR also has doubts about the need for the Navigator System, especially in large companies where in-house facilities already exist.

The Fortune 32:16, targeting the office and competing on price

Fortune Systems is headed by Gary Friedman and two other former Itel execs. With hopes to reach $100 million in two years, it has now raised $8.5 million from seven sources including Greyhound Computer, a French bank and Thomson CSF.

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Fortune is offering a Motorola 68000 based system using the Unix operating system and office applications software with an entry level price of $4,995. That in itself is news, but the company also expects to get into the systems building business, in eventual competition with today's minicomputers.

The 32:16 won't be the last 68000 based system to be aimed at the office market. Fortune says its system can run Basic, Cobol, and Fortran while offering word processing similar to Wang's. The company is concentrating on building high-level interface software and will acquire applications. Already offered is the IDOL data base management system from Science Management Corp; canned applications software and Ethernet connections are on the way.

The 68000 microprocessor can address up to 16MB and uses a 16-bit external and 32-bit internal data path (hence the name 32:16). Available memory on the 32:16 runs from 128K to 1MB. The system can support up to four Winchester and two floppy disks and is said to be able to handle up to eight users (probably through intelligent Z-80 based terminals), although the multi-user versions are not yet available. Single user 32:16 shipments will begin this spring.

All channels of distribution -- retailers, dealers, distributors, systems houses and large direct sales -- will be pursued. Fortune also reports that many major minicomputer vendors have been eager to screen the 32:16 for possible private-label arrangements. Thomson CSF has marketing rights in France.

And a new threat from Japan

If you judge an entry by the resources behind it, CIE Systems seems earmarked for success. A subsidiary of C. Itoh Electronics (the $40 billion trading company), CIE will market in the U.S. and Canada a 68000 based small business system using U.S. designed software and manufacturing by Hitachi. It will offer three models, the 680/10, /20, /40 by August, capable of from one to sixteen users and with prices in the $5,000 to $12,000 range.

With the growing list of 68000 based desktops, CIE feels that it has two features that will separate it from the pack. The first is deliverability. Hitachi has an excellent reputation for promptly delivering low cost, high quality products in huge volumes; it is also a key second source of the 68000, and thus is not subject to microprocessor supply disruption.

The second ingredient is what CIE is calling the Pro-IV application processor. CIE offers both Unix and Motorola's Versados, but it says that it is Pro-IV that will give its system builders the competitive edge. Neither an application generator nor a compiler, Pro-IV works under Unix as a tool for program conversion, i.e. 8-bit CP/M to 16-bit, and helping non-programmers to develop applications. Another key feature is self-documentation.

CIE thus believes that Pro-IV will be used by both the system builder and the end-user. Originally marketed under the name of No-code, Pro-IV has been used by both Microdata and General Automation without much fanfare. But CIE says Pro-IV has never been marketed right, and it expects DEC and IBM to offer it soon. CIE has an exclusive license for Pro-IV on the 68000.

Looking at all three ventures, it's two for the 68000, one for the 8086. But more importantly, desktops are now even deeper into minicomputer territory, a pattern that the mini boys, like DEC, have only recently recognized.

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• BAXTER YIELDS ROLE IN IBM CASE. After The Wall Street Journal revealed an embarassing series of connections between Justice Department Antitrust Chief William Baxter and IBM, Baxter has stepped away from the case, and DOJ has asked for another month to look into his handling of it. Since the January 8, dismissal it has surfaced that in 1976 Baxter lined up witnesses for IBM as part of a private antitrust suit defense; that IBM in effect paid Baxter's salary when he took a year off from his Stanford professorship, and most recently and most damaging, that since last summer Baxter has been acting on IBM's behalf in its efforts to block an antitrust suit by the European Economic Community (EEC). Meanwhile, Judge David Edelstein is still planning to hold a hearing on May 19, to determine if he can/should nullify Mr. Baxter's decision. IBM believes that the case is over, and is trying to block the hearing.

The EEC suit is one well worth watching. One of the EEC's proposed remedies for the giant's market dominance is a PCM's dream. It would force IBM to disclose certain technical data at the time of product announcement rather than first product shipment, cutting IBM's valuable lead time. IBM has defeated similar efforts in the U.S., but it is obvious to all involved that disclosure in Europe is disclosure to the world. Aware of the possible damage to IBM and U.S. trade, U.S. officials are actively supporting IBM's position.

• MORE CHAIR SWAPPING AT MAGNUSON. Former Memorex Chairman Charles Strauch has been appointed Magnuson's President and CEO, replacing Charles Cole, who was put in charge after Joseph Hitt resigned in January. Cole is now the Chairman in place of founder Paul Magnuson (who took the title when Hitt resigned), and who now sits on the board.

• CITICORP GETS GO AHEAD FOR DP SERVICES. After several years of legal squabbling, Citicorp (the bank holding company behind Citibank) has gotten Federal Reserve System permission to offer data processing services and timesharing as long as they are related to economics, banking, or finance. The Association of Data Processing Service Organizations (Adapso) has been the leading opponent. The Fed's Board of Governors has 90 days act on Judge Walter J. Alprin's ruling; the decision is expected to stand.

• IBM/NTT CROSS-LICENSING. IDC's Japan office reports that IBM and NEC are leaning toward joint development projects in the areas of fiber optics, artificial intelligence (AI), pattern recognition, and VLSI. The cooperation is notable since NTT has had a well known reputation for its anti-IBM philosophy. The new attitude is seen as part of NTT's efforts to open up its procurement procedures and dampen some of the international criticism its policies have received. NTT is considered the leader in Japanese AI efforts and is the mainstay of the nation's fifth generation computer project. NTT is also said to be strengthening its ties with AT&T.

• BASIC FOUR ADDS NEW DESKTOP, OFFICE TERMINALS, BIG CPU. Credit Basic Four for recognizing the need to integrate desktop power and software into its larger systems. Four new products include: the S/10, a dual Z-80 based desktop running CP/M, $5,995; office software for electronic mail, calendars, etc.; a Z-80 based intelligent DP/WP terminal, $3,300; and the S/810 minicomputer based on three 16-bit arithmetic logic units, $117,679. Basic Four is a subsidiary of Management Assistance Inc., which had 1981 revenues of $332 million.

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DETROIT ROBOT SHOW GRABS MEDIA SPOTLIGHT; U.S VENDORS RUSH TO BRING OUT LINES

"Inflationary periods mark the capital intensive gestation of new and more complex social and economic systems. Once the new order is established, economies of scale and specialization halt the rise of costs and prices ... But first there is a long, dynamically inefficient siege when new infrastructures are put laboriously into place ... systems emerge at great expense and without comparably swift return." -- George Gilder

Though much of the so-called computer revolution is a story of promises yet to be fulfilled, robotics is one area where today's technologies are rapidly coalescing. In its simplest form merely a high degree of mechanization, robotics is increasingly looking to many of the driving forces of computer technology. High level software, computer-aided design, image and voice processing, artificial intelligence, graphics, and VLSI circuitry are being focused on today's robots which weld, paint, package, inspect, assemble, and drill ... and someday, will mine the earth, seas and space.

In a burst of activity reminiscent of the early days of the minicomputer and desktop computer markets, new firms are appearing faster than anyone can keep track, and venture capital is everywhere. But because of the nation's search for an economic quick fix, expectations are high, running the risk of making more promises than the industry can now keep. Some points of note:

- U.S. Fortune 50 heavyweights are stepping into the game, but are usually doing it through OEM products, often of foreign manufacture.
- IBM's early entry shows both the giant's desire to get into any and all markets, and a change from its usual wait-and-see approach.
- Despite their mechanical appearance, robots are ultimately a matter of software and ease of programmability.
- The one area where the U.S. has a clear lead is vision technology, though actual use of vision systems remains limited.
- Despite the hype, only 20,000 robots are in use worldwide, and with an average price of $70,000, cost justification is still an issue.

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CRASH COURSE IN ROBOTICS LINGO

Like any new field the robotics industry comes with its own unique jargon. But the terms are few and thus robotics fluency can be quickly achieved.

Robots. Debate over what is and what isn't a robot to some extent accounts for the great numbers of robots said to be in use in Japan (see page 6). In 1979 the Robot Institute of America established the following definition. "A robot is a reprogrammable multi-functional manipulator designed to move materials, parts, tools or specialized devices, through variable programmed motions for the performance of a variety of tasks." Prices range from $5,000 to $300,000.

Non-servo robots are limited sequence machines such as pick-and-place robots and are generally capable of only a few linear movements. They lack the memory capacity needed to store programs, and thus are programmed by breaking down a given task into target positions which are met by setting fixed mechanical stops. Non-servo robots boast high degrees of "repeatability." Because their movement path is fixed, they cannot be easily coordinated with other machines or processes. They have the advantage of simplicity and lower costs.

Servo robots use software programming to allow for a wider array of positions and movement paths. Target positions are specified in the program and the machine automatically adjusts itself to these locations, either through transducers, motors, circuits, valves, or sensors. Servo robots can be programmed on- or off-line. Most future robots will be servo machines.

Programming. Robots can be programmed in three ways. The walk-through method is the most primitive form; the operator releases all machine stops and then manually moves the machine through the sequence needed to perform the task. The controller then remembers the coordinates of each position. Most on-line programs today use teaching pendants which are handheld remote control devices used to set the robot's target positions. Use of teaching pendants is also referred to as the "lead through" method. Unlike the computer industry, off-line is the most advanced programming method. In an off-line mode, movement sequence programs are downline loaded from some form of computer storage. The off-line method facilitates the programming of multiple machines as well as readying new programs without interrupting ongoing tasks. Off-line operation is also the key to linking robotics with computer-aided design data.

End-effector is the awkward-sounding term used to describe the functional tool at the end of the robots arm. Generally not considered to be part of the robot, typical end-effectors include welding torches, drill bits, screwdrivers, grippers, sensors, and paint spray guns.

Degrees of freedom refers to the number of axes (i.e. x,y,z) along which the robot is capable of moving. Each joint, at the arm or wrist, can move in up to three directions. Thus a two-limbed robot will have from one to six degrees of freedom. High degrees of freedom are needed for multiplanar tasks.

In addition to these definitions, robot vendors compete with each other primarily on the following criteria: repeatability measurements; speed of movements; ease of programmability; accuracy (to within 1/10,000 of an inch); sensory capabilities (if any); strength of arms and wrists; reliability; flexibility; simulation; vision; diagnostics; programming languages; service reputation; consulting services; and, of course, price.

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The crush of humanity at the recent Robots VI conference in Detroit (sponsored by the Society of Manufacturing Engineers) was reminiscent of the most sardine-like moments at the National Computer Conference. Sitting in the backyard of the declining auto industry and with the Governor of Michigan grandstanding for his beleaguered state, the conference took on the air of national importance, a fire fanned by the presence of most of the nation's major media.

U.S. giants half-in, half-out

Not long ago the U.S. robotics industry consisted of Unimation, Cincinnati Milacron, Prab, Copperweld and a bunch of small firms few have heard of. If nothing else the presence of General Electric, Westinghouse, IBM, Bendix, Textron, and United Technologies lent an air of permanence to a floor full of odd sounding firms such as Acrobe Positioning Systems and Sandhu Machine Design.

Coinciding with the entrance of the giants has been an expansion in robot applications. Though automobile tasks like welding and painting are still dominant, more attention is being focused on assembly functions, especially by electronics firms like IBM and Westinghouse. But with the exceptions of Bendix and Textron, the U.S. companies were mostly hawking servo robots of foreign manufacture, usually with the intention of building their own systems soon.

Though General Electric is said to have more in-house robot expertise than anyone on either side of the Pacific, it looked to Italy (DEA), Germany (Volkswagen) and Japan (Hitachi) for the three machines it had on display. Only the DEA machine was programmable off-line. It is based on an LSI-11 and uses the HELP language. The other two machines were programmed via a teaching pendant.

GE believes the "factory of the future" will contain the following elements: vision; robotics; programmable assembly; numerical control; information services; process management; interactive graphics; and programmable controllers. The company says that it will start building its own robots next year. It has set up a consulting center in its Schenectady, NY facility to recommend specific robotics technologies for in-house use. Last year, GE acquired Calma and a 48% interest in Structural Dynamics Research Corp.

A similar internationalism was found at the Westinghouse booth. The diversified electronics company is getting robots from Mitsubishi (simple welding), Komatsu (sophisticated welding), and Olivetti (assembly). The Series 1000 and 2000 are Westinghouse designed and built and are geared toward light assembly; the 2000 can be controlled by voice commands. The company's integrated robotics/computer-aided design system makes use of Computervision gear. Because of the diverse sources, the Westinghouse machines do not use consistent programming methods.

Like GE, Westinghouse says that selling robots is only a small part of what it offers; targeting user needs and outlining "system solutions" is where the real gains are said to be had. Westinghouse says it is doubling its already large robot laboratory, and is working with Carnegie-Mellon on various artificial intelligence projects. The company claims high levels of expertise in numerical controls, CAD, vision and programmable controllers. Westinghouse says that it has some 70 robots working in in-house production environments.

Bendix was a pioneer in robotics. It helped develop a painting robot for GM, which the latter may decide to bring to market, and more than a decade

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ago it created a two-arm assembly robot. Those efforts proved premature, but now Bendix makes two robots one with 45 lb. lift capacity the other with 150 lb. A Bendix spokesman at the show said that he expected the market to develop slowly, since even in-house implementation has been limited.

United Technologies is getting its robots from West Germany. A license agreement for both manufacturing and sales with Nimak-machinen Automation was announced at the show. Labeled the NIKO line, the products concentrate on spot welding applications with automobiles being the target market. Textron's Bridgeport Machines Division has designed an electrically powered assembly robot and says it has made a major commitment to robotics and will start building in quantity by 1983.

Although it did not exhibit at the Detroit show, General Motors has recently announced that it too is using a foreign manufacturer to get into the robotics market. It has entered a joint venture with Fujitsu Fanuc to design and build robots in the U.S. and Japan. A numercially controlled paint sprayer will be the first product. GM expects to have 20,000 robots installed by 1990.

IBM makes big splash ... will move fast

> *"Since 1972, IBM's Research Division has worked on advanced topics in robotics, machine vision, and 3-D solid geometric modeling. The emphasis has been on industrial assembly and test applications. Developments have included a novel hydraulic motor and several generations of systems software, including five robot languages, a 3-D solid modeling system, a graphic simulator, and smart teaching-by-showing programs. We have also participated in feasibility demonstrations and actual factory installations."* -- David D. Grossman, Manager, Automation Research, IBM.

IBM's announcement of a low-cost robot (the 7535) programmed by its Personal Computer (PC) a few weeks before the show had to make the robot show promoters smile. It was perhaps the final coup that assured the high levels of press coverage that culminated in brief spots on the network news.

At the show IBM displayed two products -- the 7535 and a more sophisticated, previously unannounced, RS1 robot controlled by a Series/1. Both machines can be programmed off-line. The 7535 tasks are specified in x,y,z, coordinates using AML (A Manufacturing Language) which is loaded into the robot's Z-80-based controller; one PC can thus program any number of robots.

The 7535 was built to IBM specifications by Sankyo Seiki in Japan. It is designed to automate light assembly tasks, but can also be used for drilling, soldering, inspecting, and packing. IBM stresses the high speed and accuracy of its hydraulic motor design. The 7535 is priced at about $28,000, not including the 128K dual-drive personal computer that runs another $5,500 but can be used for general purpose applications as well. Deliveries are expected to commence in the fourth quarter of this year.

The RS1 is a more experimental and sophisticated device being offered on what IBM is calling a "limited test marketing basis." Designed and built by IBM, it uses both tactile and photoelectric sensors in its gripper and can be programmed by either an off-line program or a teaching pendant. The RS1 uses a superset of the AML language found with the 7535, and IBM recommends that

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the system have a programmer's support. IBM estimates that the RS1 will sell for about $100,000, with the price including the Series/1.

IBM says it will move aggressively in the robot area, focusing initially on small batch assembly applications. Internally IBM is using robots to assemble circuit boards, to feed parts, to thread typewriter ribbons, and to test wiring connections in the backs of large CPUs. In 1978 it moved beyond the pure research mode by setting up an Advanced Manufacturing Group in Boca Raton, and robot research efforts continue at the company's Yorktown facility.

In its research labs, IBM has been involved in developing off-line, teaching pendant, and CAD-based systems, and believes that each method has strengths and trade-offs. In the area of languages, before settling on the AML, IBM experimented with versions of Basic, Fortran, and PL/1. IBM says that AML "is both a good robot language and an excellent computer language, combining some of the best features of Algol, APL, and Lisp in a blend particularly suited to robot programming." AML uses commands such as "move," "grasp," and "delay" and is said to be relatively easy to master. AML was developed solely by IBM, and is not presently available to other vendors on any kind of license basis.

Other giants are also believed to be on the verge of entering the robotics market, among them: Digital Equipment Corp., Hewlett Packard, and Texas Instruments. How fast these large firms will grab market share from Unimation and Cincinnati Milacron (together believed to have 60%-70% of the market) remains to be seen, but they will pump capital into the industry as well as quicken the pace of price/performance improvements. As for those who remain skeptical, is it really possible that all these companies could be so wrong?

U.S. market, how big?

The U.S. robotics market seems to be breaking down into three different types of companies: large manufacturers, large computer vendors; and small firms specializing in robot technology. Not surprisingly, with the existence of some 40 U.S. vendors, analysts are already trying to pick the survivors.

The problems of predicting the robot market are obvious -- much depends on user acceptance, falling costs, and the success of vendors in targeting user needs. Best estimates are that the 1981 U.S. market was worth about $150 million. As to the future, the consensus seems to be that the market will grow 30%-40% per year. Among the U.S. estimates seen by EDP/IR:

- Bache - $400 million by 1985
- General Electric - $1.5 billion by 1990
- Business Communications Corp. - $4.6 billion by 1990
- Westinghouse - $2 billion by 1990

The Society of Manufacturing Engineers estimates that there are somewhere around 4,000 robots installed in the U.S., with about one-third of all new installations going into the U.S. and about half to Japan. According to the British Robot Association, 370 robots were in use in the U.K. at the end of 1980.

Perhaps the biggest obstacle to growth is lack of skilled people. Robotics demands a rare combination of skills in computers, mechanics, and manufacturing processes as well as experience with specific industry problems. Both the universities and industry have a long way to go to meet this need.

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What's happening in Japan

The Japanese presence at the Detroit show was clearly felt, even though less than ten Japanese companies were demonstrating products under their own name. As in the computer industry it looks like Japanese firms will do most of their U.S. selling in an OEM capacity, and as U.S. firms scramble for deliverable products this channel looks wide open.

In Japan, of course, the situation is quite different. Robots have been on management's mind for at least the last five years and installations have greatly exceeded U.S. figures. Just how many robots are used in Japan is in some dispute due to differing definitions over what constitutes a robot.

According to Japanese robot analyst Paul Aron, there are some 130 Japanese firms making robots. As in the U.S., small companies abound with about 50 companies having capitalization of less than $500,000. Unlike the U.S. there are as yet no dominant suppliers; Kawasaki is probably the leader, but it has less than 20% of the Japanese domestic market. Other key players are Hitachi, Mitsubishi, Seiko, Yasakawa, and Fujitsu.

The best robot numbers to come out of Japan are probably those from the Japan Industrial Robot Association (JIRA), although that group would be the first to admit the difficulties of robotics forecasting. JIRA is now estimating that Japanese domestic shipments for 1981 were over $500 million, reaching $2.5 billion by 1985, and $5 billion by 1990. But JIRA estimates in the past have consistently underestimated the market; the association's estimates of the Japanese installed base at the end of 1980 are given below:

INDUSTRIAL ROBOTS IN JAPAN, 1980

	Installed base	1980 Shipments
Manual manipulator	8,790	1,500
Fixed Sequence	56,460	15,000
Variable Sequence	6,100	1,800
Playback and NC	3,460	1,050
Intelligent	1,690	350
Total	76,500	19,700

But the Japanese numbers shown above include both manual manipulators and fixed sequence devices, neither of which are considered as robots by U.S. market analysts. If these two classes of machines are stripped out of the Japanese total, the installed base as of the end of 1980 drops from 76,000 to 11,250, still well above U.S. estimates ranging in the 3,000 to 5,000 area.

Reasons for higher Japanese use of robots run through the usual cliches about a secure labor force not threatened by innovation, company retraining of displaced workers, long term management horizons, lower capital costs, and employee support of automation, although recently union resistance has emerged.

In a survey by JIRA; Japanese companies cited the following motivations for installing robots (listed in order of priority): 1) economic advantage; 2) increased worker safety; 3) universalization of production systems; 4) stable product quality; 5) labor shortage. But whatever the reasons, the Japanese are expected to lead the world in robot installations over the next five years.

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Vision systems, U.S. has the technological lead

The robots that exist in the popular consciousness wouldn't be robots at all if they couldn't see and speak like human beings. But the use of vision systems is still almost entirely experimental, as is the use of voice. Yet vision is necessary for certain applications such as grabbing parts loosely piled in a bin, inspection and verification tasks, or working on objects not precisely placed in prearranged spots. Vision systems will also open up new applications areas such as mining and underwater and space tasks. Voice systems are more fully developed, but perhaps less of an imperative; audio ouput can be used to communicate diagnostic information to the operator, or to signal various warning or guidance information.

Vision work has its roots in the artificial intelligence (AI) institutions such as Stanford University and the Stanford Research Institute, M.I.T., The University of Rhode Island, and Carnegie-Mellon. Recently, large corporations such as Schlumberger have expressed keen interest in AI, and there is significant cross-over technology from a wide array of video enterprises. AI expertise is now at a premium with skilled workers able to write their own tickets.

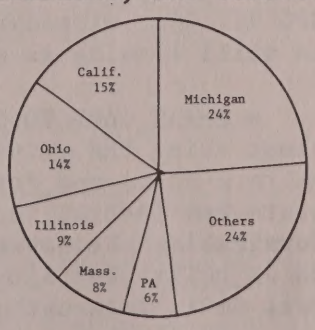
Currently only a handful of companies have integrated image processing with robotics. Machine Intelligence Corp. (MIC) (Sunnyvale, Ca), Automatix (Burlington, Ma), Object Recognition Systems (ORS) (NYC), Octek (Burlington, Ma), and Copperweld (Troy, Mich) are the current leaders. There are however, another 20 or so firms with image processing technology. According to ORS, robotics is such a small segment of the video processing market that many firms have yet to explore its possibilities; consequently, lots of image processing expertise has yet to be focused on robotics applications. Additionally, many large U.S. and Japanese firms have conducted advanced vision research in-house.

The most prevalent form of machine vision is that developed by MIC. Its VS-100 system is based on an LSI-11/2, and includes four cameras, some custom circuitry and MIC software with a typical cost of about $20,000, not counting the robot. MIC uses Unimation's Puma. Light is shot up from underneath the objects and the machine compares the silhouettes to images stored in memory. The weaknesses arise when objects overlap or it is impossible to shine light up through the objects, as is the case in a bin full of parts.

Object Recognition Systems (ORS) claims that it has made a break through. Using knowledge originating from the robotics work at the University of Rhode Island, the company offers a technique called "gray scaling," or edge detection. ORS claims it has the only vision system capable of picking random parts out of a bin; prototypes of its system have been used for sorting returned goods, inspecting graphics on packages, checking package contents, reading codes and expiration dates, inspecting keys on computer terminals, and others.

Robots, where they're coming from

As the chart to the right indicates, robot action is spread out among many states with a blend of high tech and heavy industry states. The pie shows the locations of the 87 U.S. firms at the show. Michigan sees itself as the natural center for robot work, but it is hampered by its high wages and union dominance.



Total Companies - 87

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• IBM TIPS HAND ON LOCAL NETS. Although no announcement has been made, IBM has submitted papers to the IEEE indicating its plans for a baseband, token passing local area network. IBM apparently feels that baseband is sufficient to meet most user's needs, but nothing in the IEEE filing rules out any future broadband offerings. IBM has rejected the Xerox/Ethernet choice of CSMA/CD and a bus structure in favor of the simpler token passing concept under a ring architecture. A formal announcement is expected soon.

• STRATUS GETS FIRST BIG ORDER. Olivetti has been granted exclusive marketing rights for the Stratus/32 Continuous Processing System for selected countries in Europe, South America, and Africa. Stratus estimates that the deal will be worth about $40 million, with shipments beginning in April. The Stratus machine competes with Tandem in the non-stop computing marketplace.

HONEYWELL ADDS MID-RANGE CPU, REDUNDANT CAPABILITIES. All members of the DPS 8 family now offer dual processor and "full-tandem" system options. The new mid-range DPS/50 comes with from 2MB to 32MB memory with the 2MB system priced at $285,000; it will be available in the third quarter of 1982 for the GCOS line and the fourth quarter for CP-6 users.

• STC SHUFFLES TOP EXECS. CEO and Chairman of the Board, Jesse Aweida has given up his presidency to his brother Naim Aweida who will be in charge of engineering, manufacturing, marketing, personnel, and support. Brother Jesse will continue to control technology, finance, strategy, and administration. Storage Technology is destined to crack the $1 billion club in 1982.

• IBM ADDS HIGH-END SYSTEM/38. Once just a talented orphan, the S/38 is slowly being brought into the mainframe fold through new communications products; IBM has also recognized the S/38's need for larger main memory. The new Model 7 is said to offer up to two times the internal performance of the Model 5 and twice the main memory (up to 4MB). It is field upgradable from the Models 3, 4, and 5, and is software compatible with all previous S/38s. Certain configurations of the Model 3 and 5 are being withdrawn from the market; purchase prices for the Model 5 are being reduced from 10% to 19%. First customer shipments will begin in January 1983. Prices for the new model 7 range from $160,000 to $240,000.

On the communications side, the Series/1 continues to be taught new communications roles; a local (400 foot) attachment to a S/38 at speeds up to 56kbs hints at eventual front-end applications. IBM also made several enhancements to the S/38's bisynch capabilities and promised further links to the 370, 4300, and 303X machines. Also announced was a S/34 to S/38 conversion aid for RPG II, OCL, displays, sorts, menus, message members, and data files. But what is still missing is a low-end processor bridge to the S/38 for the S/34 base.

• SMART CARD TO CUT FOOD STAMP FRAUD? The U.S. government may be serious about using the chip-in-a-card technology to help cut back on food stamp and welfare costs and fraud. A recent meeting in Washington, D.C. attracted much state and federal interest, but the technological and capital restraints remain formidable. Reliable, field-tested cards that won't be ruined if bent have yet to be built, let alone mass-produced. Among those in the hunt are CII Honeywell Bull, International Micro Industries, Philips, and Flonic Schlumberger.

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"The Gray Sheet"

EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

MOLLY UPTON, EDITOR MARCH 20, 1982 ● VOL. 17,NO.22 P.J. MCGOVERN, PUBLISHER

1982 MIS BUDGETS TO INCREASE 18% TO $77 BILLION; COMMUNICATIONS FASTEST GROWING SECTOR

Despite being eyeball to eyeball with what may be the deepest recession since the Depression, spending by U.S. MIS departments will suffer less retrenchment than might be expected. 1982 spending will rise 17.7%, reaching $77 billion.

That's the conclusion reached in International Data Corporation's annual survey of large MIS departments. The nearly 200 respondents also reported that their 1981 spending was up 19% over 1980 levels, and probably would have hit the 20% figure had not recessionary pressures forced fourth quarter cutbacks.

Given the recession-induced dwindling of the inflation rate (most 1982 estimates are in the 4% to 9% range), an 18% increase in 1982 would represent substantial real expansion. In an economy that will show little or no overall growth, these user expectations are remarkable, perhaps suggesting that in times of slack demand, computerization can still present an attractive ROI.

The IDC forecast includes MIS (not corporate-wide) spending for: computer hardware, data communications equipment, software and services, supplies, staff expenses, and overhead. The most sluggish of these sectors -- supplies -- will grow at 13%, while the fastest -- communications -- will swell by an impressive 31%. Other highlights of the IDC survey and analysis:

- There will be a marked shift toward purchase of CPUs as many IBM 3033 users exercise their purchase option credits. Additionally, 3081s will primarily be leased from IBM.

- The slowest growth rates will be found in those industries under particular economic duress: education, government, retailers, and savings and loan organizations.

- The provisions of the 1981 Economic Recovery Act will stimulate demand. Software depreciation, five-year write-offs, investment tax credits, and new leasing flexibilities have sent many users scurrying to their accountants.

- Communications, terminals, software, and maintenance will be the fastest growing sectors.

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MIS EDP SPENDING 1977-1982
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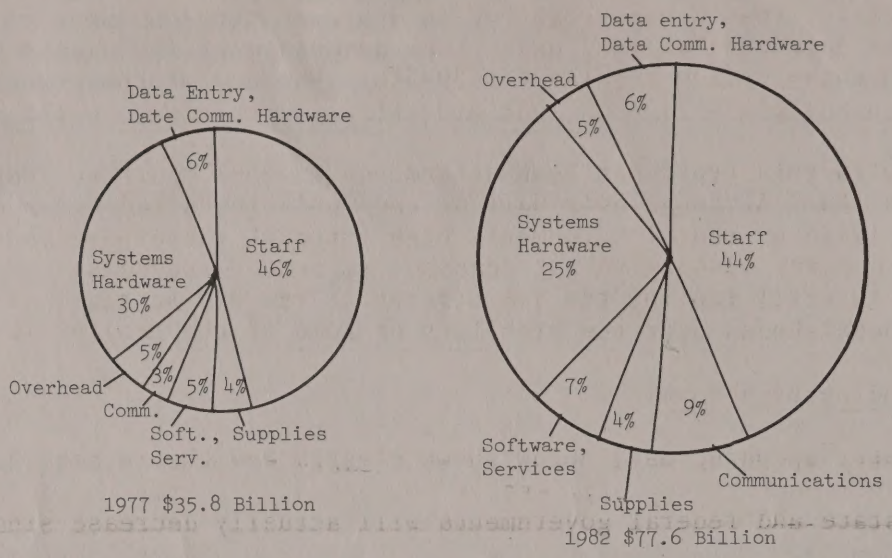

MIS managers, caught in the middle

Despite the rosy overall increases expected, the recession will certainly not be without its impact on many MIS shops. The urge to hold down expenses in times of declining sales may leave MIS managers in the familiar position of being asked to do more with less. Indeed, many users said their spending estimates might turn out to be high if the economy continues to deteriorate.

In 1981, the 19% spending increase fell one percent short of IDC's forecasted 20% growth. Hardware, supplies, and staff grew slightly less than expected, but the biggest drop off was in overhead which increased only 11% compared to a projected 18%. Apparently, many users delayed major plant/facility improvements because of budgetary constraints.

Offsetting these factors, spending on software, communications and terminals was greater than anticipated. Perhaps the most dramatic shift was a 41% increase in expenditures for manufacturer's software, due to steadily rising IBM software prices, as well as some unbundling by other vendors.

In searching for places to cut back in 1982, users will naturally look at personnel, a full 44% of the budget. Training, travel and head hunter expenditures may feel the pinch, and MIS directors will once again tackle the issue of increasing programmer productivity -- be it through higher level languages, information centers, or other elixirs. Communications spending is also an area that will come under tight scrutiny as users step up their analyses of the various available communications alternatives.

But barring any drastic changes in MIS management, chargeback systems will remain the key MIS defense. An effective chargeback system can give MIS a simple answer to end user demands -- "you want it, you pay for it." Despite the difficulties in implementing such systems, IDC research has shown that 75% of those companies with annual EDP budgets of more than $2 million have chargeback systems in place, and that nearly two-thirds of this group claim to be charging back between 90% and 100% of their costs to the end users.

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A bad year for third party lessors?

Spending for hardware has undergone some significant changes. 1981 showed a trend toward purchase, as many users took advantage of IBM's attractive prices and purchase option credits for 3033's. Because of these purchases, maintenance spending was high in 1981 and will stay that way in 1982.

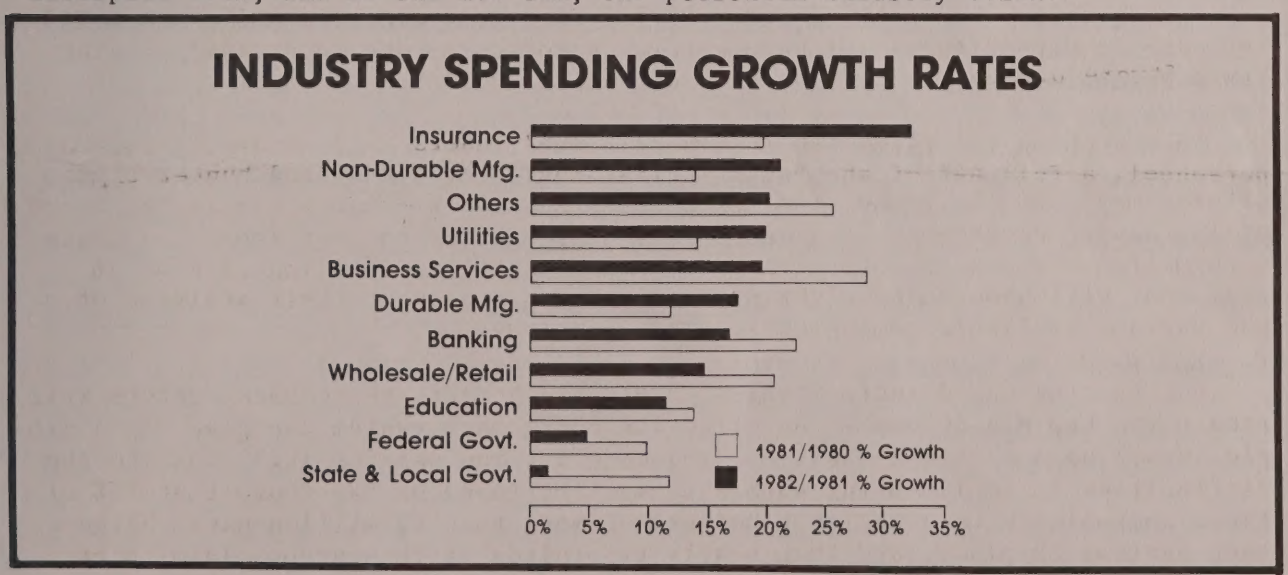
Coupled with this trend has been a tendency of 3081 users to lease their machines from IBM. Although over half of the 3081s installed today are on some type of lease or rental agreement, high interest rates have made it difficult for third party lessors to put together attractive packages, and the leasing industry is still feeling the ill effects of the OPM scandal. There is also some squeamishness over the viability of some of the smaller lessors.

Industry spending breakdown

The industry spending data below shows clearly how the recession and changes in government policy will effect EDP spending patterns. In real terms spending by state and federal governments will actually decrease since their nominal 1.7% and 5% increases will not even compensate for the effects of inflation; the drop in real state government spending was particularly steep.

It is interesting to note that, with the exception of the insurance industry, the major EDP spending increases are coming from the capital intensive side of the economy. People-intensive areas such as the banking, education, retail, and business services markets will not be able to keep pace with 1981 spending; while so-called heavy industries such as utilities and durable and non-durable manufacturing will show healthy increases.

Over the years IDC has tracked how EDP spending varies among particular industries. Despite the difficulties in sampling and in getting consistent corporate definitions, the data has proved to be accurate, based on feedback from IDC's large clients. Overall, large organizations usually spend between 0.8% and 1.5% of their revenues on MIS EDP. Not surprisingly, these percentages vary greatly among industries. On the high end are industries such as aerospace 1.8%, and at the low end, the petroleum industry 0.25%.



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U.S. MIS EDP SPENDING 1980-1982
(Copyright 1982 -- International Data Corporation)

	1980 $M	81/80 %	1981 $M	82/81 %	1982 $M	% of Total Budget
Systems Hardware	14,010	20	16,755	14	19,030	24.5
Data Entry and Data Communication Equip.	3,265	18	3,865	26	4,870	6.3
Software	1,715	28	2,200	29	2,840	3.7
Services	1,775	32	2,345	14	2,680	3.4
Soft./Serv. Subtotal	3,490	30	4,545	21	5,520	7.1
Communications Line Charges	4,210	23	5,175	31	6,790	8.7
Supplies	2,275	14	2,595	13	2,925	3.8
Staff Expenses	24,865	18	29,430	17	34,410	44.3
Rent, Overhead, Other	3,265	11	3,625	14	4,140	5.3
Total	55,380	19	65,990	18	77,685	100.0

U.S. MIS HARDWARE SPENDING
(Copyright 1982 -- International Data Corporation)

	1980 $M	81/80 %	1981 $M	82/81 %	1982 $M	% of Total Budget
Rental or Lease Payments to Manufacturer	7,165	17	8,375	16	9,680	12.5
Lease Payments to Third Party	2,110	10	2,330	-2	2,295	2.9
Depreciation	2,495	26	3,140	10	3,450	4.4
Maintenance	1,790	32	2,360	23	2,920	3.8
Other	450	22	550	26	695	0.9
Systems Hardware Subtotal	14,010	20	16,755	14	19,030	24.5
Data Entry and Data Comm. Equipment	3,265	18	3,865	26	4,870	6.3
All Hardware	17,275	19	20,620	16	23,900	30.8

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CDC PROPOSES JOINT SEMICONDUCTOR RESEARCH EFFORT, INDUSTRY LEADERS SLOW TO MAKE COMMITMENTS

Question: Why is it that when the Japanese government organizes a joint multi-million dollar semiconductor or fifth generation computer research project, the rest of the world quakes, but when major U.S. firms propose to do largely the same thing, the whole venture looks unnatural, almost un-American, seemingly overrun with problems and skepticism?

The answer no doubt lies in the different business practices in the two countries and in our desire to find a simple and palatable explanation for Japan's rapid rise to prominence in the computer industry. But now, after years of fuss about "Japan, Inc.," U.S. firms may get a chance to learn first hand about the pros and cons of joint enterprise.

As outlined by Control Data Chairman William C. Norris, the Microelectronics and Computer Technology Enterprises (MCE) would pool the resources of participating companies to set up a profit-seeking joint development center with an annual budget of about $100 million.

The center would concentrate on both pure and applied R&D as well as consulting and educational services, and would be restricted to U.S. computer and semiconductor firms as well as certain key users, trade associations, and universities. A total of 21 firms and organizations attended the Florida meeting with the three most conspicuous absentees being AT&T, IBM and Intel.

In a parallel development, the Semiconductor Industry Association (SIA) has announced its plans for a Semiconductor Research Cooperative (SRC). The SRC is a less grandiose plan that is intended to beef up pure research through the nation's universities. According to its plan, member firms will contribute funds to the SRC which will allocate them to selected university labs. A spokesman said that the SRC plans to distribute about $4- $6 million a year; organizational details and an executive director should be announced shortly.

The two plans fall into a new pattern of collectivism that Fortune has already dubbed the rise of "America, Inc."; they also come on top of a wave of isolationist/protectionist sentiments aimed at the Japanese. The denial of a fiber optic contract to Fujitsu on trumped up charges of "national security" and "low-balling," charges of predatory pricing in the 64K RAM market, various "reciprocity" talk floating through the halls of Congress, increasing concern with trade imbalances, and the bad taste left by previous successful Japanese market invasions have joined with the nation's troubled economic times to create what now looks like a critical mass of anti-Japanese policymaking. The lessons of the past notwithstanding, there's nothing quite like red ink and a recession to stir up protectionist, almost jingoistic rhetoric. Look for some type of minor Japanese concessions to help cool off the attacks.

According to Chairman Norris, the MCE has been necessitated by: the increasingly capital-intensive nature of the semiconductor business, the scarcity of physical and human capital, and the existence of well-financed and highly competitive foreign competition. By pooling people and money, the MCE hopes to avoid having each U.S. firm invent its own wheels, while enabling U.S. firms to economically gear up for technological hurdles such as the 256K RAM market which some merchant houses may decide to let pass by. The CDC exec has termed the MCE a "national necessity."

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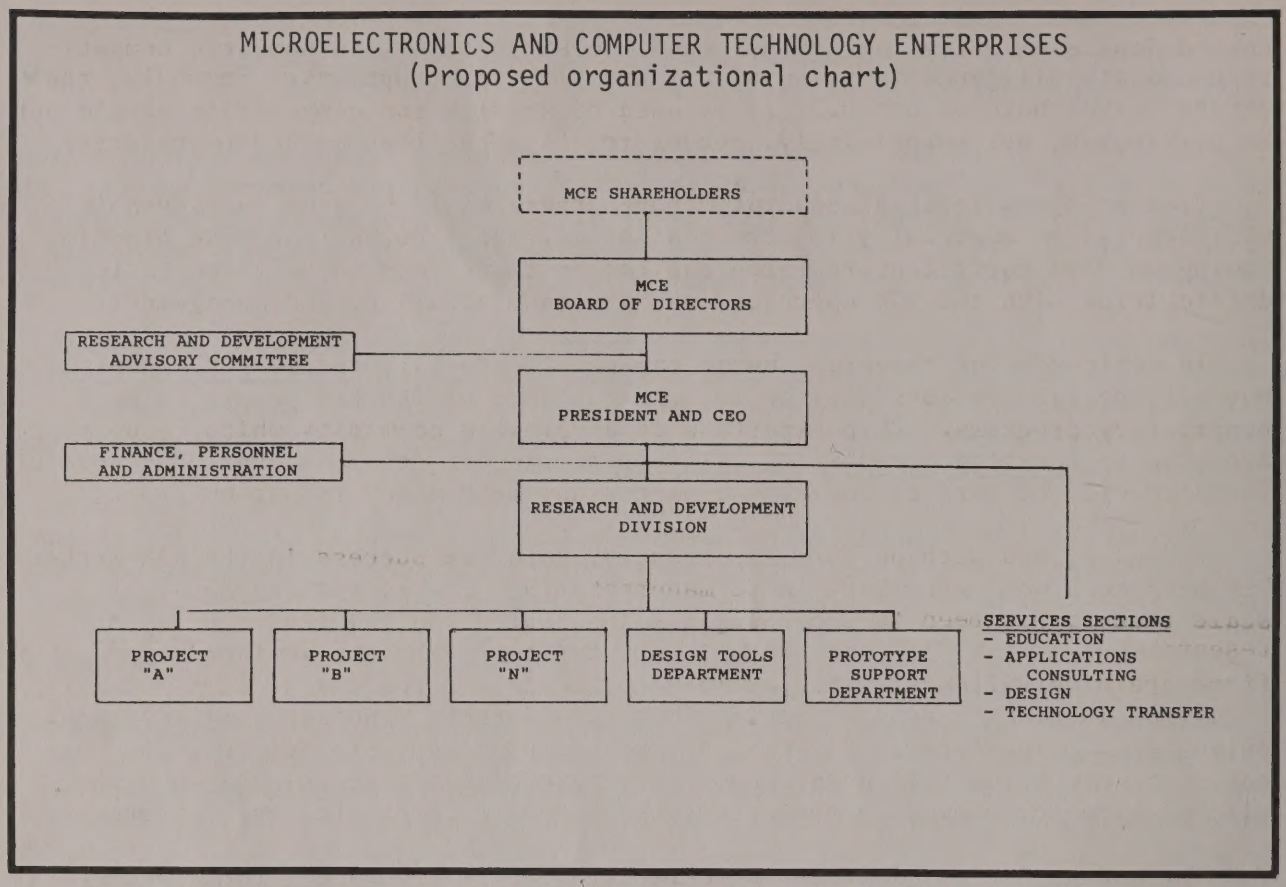

The MCE will address virtually all areas of semiconductor development. According to the proposal, the center will go after anything that will improve the nation's competitive position in computers, microelectronics, and related devices and products. Among those specifically mentioned:

- Basic research
- Instrumentation development
- Packaging technology
- Software development
- Artificial intelligence
- Manufacturing processes
- Relations with universities
- Applied research
- Process development and testing
- Prototype or pilot plant operation
- Computer architectures
- Training and education
- Quality control
- Relations with trade groups

Looking at the above list, it is obvious that Norris sees the center as a key organization in the world electronics market, possibly even a counterweight to the Japanese fifth generation computer project. Yet despite all the hoopla, EDP/IR wonders if U.S. firms are capable of turning Japanese overnight, i.e. viewing other U.S. firms as allies, and seeing competition in terms of nations, not companies. The plan suggested by the SIA may be a necessary first step.

Certainly the concept behind the SRC is less controversial. Because areas of pure research, such as Gallium Arsenide circuits, seem more appropriate for cooperation, the SRC plan, although less ambitious, may prove to be the more viable since it will steer clear of any applied technology, and the conflicting competitive interests seemingly inherent therein.

But neither plan is a panacea. There is some reason to think that the role of cooperation in Japan has been greatly overestimated, and that the real

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key to Japanese success abroad has been the strength of its domestic competition and its diligence in pursuing any and all export options. Secondly, the psychological hurdles for U.S. firms used to secrecy and competition should not be overlooked; not surprisingly, vendor reaction has been marked by reserve.

From an operational standpoint, though there could be some considerable efficiencies -- especially for the smaller merchant houses that have trouble coming up with sufficient research capital -- there seem to be three basic difficulties with the MCE approach; people, manufacturing, and management.

In semiconductor research, human capital is crucial, and EDP/IR wonders how willing U.S. vendors will be to loan out some of its key people to non-proprietary programs. Chip expertise is a valuable commodity which vendors are used to hoarding not sharing. If top people are not made available, useful research will be hard to come by no matter how much money is put up front.

Secondly, and perhaps more importantly, Japanese success in the RAM market has been much more attributable to manufacturing prowess and economies of scale than it has been to technological innovation and the fruits of joint research projects. With the exception of Fujitsu, Japanese semiconductor firms are diversified electronics manufacturers that use a a wide variety of chips for in-house purposes, giving them considerable manufacturing leverage. Unless firms like General Electric and Westinghouse were to get into the market, U.S. companies will never enjoy this type of integration, and thus the slim margins for commodity products such as RAMS will not be easily overcome.

The management problems are also rather scary. Allocating funds and assigning people and resources will almost inevitably lead to some squabbling. The project is without precedent; technology licensing agreements and joint ventures have always been a part of the industry and have been successful, but those enterprises have always been of a quid pro quo nature. To expect seasoned competitors to suddenly open up to each other is asking a lot.

On the other hand, many are dissatisfied with the research output of our universities, and the rush toward 256K chips has left some U.S. suppliers winded. The nation's role as world leader in the information processing industry is facing its first serious challenge, and organizations like the MCE and SRC show that the industry is looking at things from a global perspective. That in itself is significant, but only time will tell whether the new collectivism will play a major role in the never-ending hunt for faster memories. Give CDC credit for its bold initiative, and wish it the luck it will need.

ATTENDEES AT MCE FORUM

- Advanced Micro Devices, Inc.
- CBEMA
- Dept. of Defense
- Electronic Industries Assoc.
- Harris Corp.
- Mass. Institute of Technology
- Motorola Corp.
- National Semiconductor Corp.
- Signetics Corp.
- Texas Instruments
- Xerox Corp.
- Burroughs Corp.
- Control Data Corp.
- Digital Equipment Corp.
- Gellman Research Associates
- Honeywell Corp.
- Mostek Corp.
- NCR Corp.
- Rockwell International
- Sperry Corp.
- United Technologies Corp.

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• HARRIS SHOWS NEW DDP WARE. A dual processor Multifunctional Integrated Design (MIND) system can be linked with IBM, Burroughs, Univac, CDC, and Honeywell machines, but is aimed primarily at the IBM 8100 market and the niche carved out by Four Phase. The Mind system supports both bisynch and SNA connections, and Harris to IBM links are achieved through 3270 emulation. The processor can run up to 1MB and is upward compatible with Harris' 1600 and 9200 proceesor families. Harris also introduced a new 64K RAM intelligent terminal. The MIND system will be available in April with a typical 5-work-station system and all necessary software priced at $80,000.

• MAGNUSON SCRAMBLES FOR NEW FUNDS. The beleaguered PCM has reached an agreement in principal for at least $3 million from a group of private investors led by Hambrecht and Quist. The company will also restructure its debt with the Bank of America if it can meet certain bank terms for additional funding. Magnuson also announced that its fourth quarter losses may reach $20 million.

In other PCM news, Amdahl cited production problems with its 5860, and says it expects to report substantially lower earnings for the first three quarters of this year. The 5860 is Amdahl's response to the 3081K; it was originally scheduled for shipment in the second quarter, but that date has been pushed back to August. The company expects volume shipments before year's end.

• INTEL ANNOUNCES DATA BASE PROCESSOR. Called the iDBP, the processor performs file and data base management functions for applications executed on separate host computers. A typical configuration will come with 512K RAM, an RS-232 interface, and an SMD controller which supports up to four disk drives. The unit will list for $9,500 for volume board sets or $15,000 in a standalone configuration. The subject of constant rumors since the acquisition of MRI three years age, the iDBP will be sold to systems houses, OEMs, and sophisticated end users. The move is part of Intel's overall strategy to get into the systems business as profits in the microprocessor and memory market feel the squeeze of competition.

• BURROUGHS MAKES FIRST MOVE WITH MEMOREX. Memorex will take over Burroughs' Westlake, CA complex in order to make more of its IBM compatible 677 disk pack drives. The facility was previously used to make the Burroughs 207 fixed head drive which will now be made in Winnepeg, Canada. Memorex is assuming management responsibility for both the Westlake and Winnepeg facilities. A Burroughs spokesman said that no jobs are being gained or lost.

• A VICTORY FOR ADAPSO? In what is more a matter of principle than large dollars and cents, IBM has agreed to unbundle its SSX operating system on the 4321. The Association of Data Processing Services Organizations (Adapso) had been protesting against the bundled product since it was announced in November of last year, and IBM apparently has decided the issue isn't worth giving the trade group new rounds of ammunition for any future squabbles.

• AT&T FILES FOR PACKET RATES. The Bell Packet Switching Service (BPSS) will be the regulated backbone of the deregulated Advanced Communications Service (ACS). According to the new filing, the BPSS would require users to assemble and disassemble their own packets, with the network providing an interchange function. Functions such as protocol and code conversion will come with ACS.

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EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"The Gray Sheet"

MOLLY UPTON, EDITOR FEBRUARY 24, 1982 ● VOL.17,NO.21 P.J. MCGOVERN, PUBLISHER

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IBM REENTERS SERVICES BUSINESS; TARGETS REMOTE PROBLEM SOLVING MARKET

"A name which you all know by sight very well,
But which no one can speak, and no one can spell." -- Charles Lamb

"It's not a service bureau; it's not a service bureau; it's a remote interactive computing operation." That's the message from Armonk, where the word "services" is so taboo that a five-page press release describing the new offerings never even uses the word. And with talk of Consent Decrees, cross-subsidies and bundling already astir, IBM's lawyers may soon be back on the job.

But what's in a name? Less than a month after the big antitrust victory, IBM has gone back into the services business, targeting the remote problem solving market, a $2.5 billion industry in 1981 that is growing at 18%/year.

The new IBM Information Network (IIN) is centered in Tampa, FLA with SNA-based 3705 controllers in seven major cities. MVS, VM, and DOS/VSE operating systems as well as some 100 IBM program products will be made available to anyone with either a 3101- or 3270-compatible terminal. The IIN is a separate business unit that comes under IBM's Information Systems Group which holds the old DPD, OPD, and GSD marketing forces, renamed last December as "National Accounts" and "National Marketing."

Reactions to the IIN have followed the Rorschach principle, with different people seeing very different things. Though some were disappointed by the lack of scope -- there is no talk of transaction processing, data base publishing, electronic mail, or unusual applications -- EDP/IR believes it would be naive to underestimate the IIN's potential: key possibilities include:

- Software distribution. Though IBM's application software is limited, IBM could use the IIN to distribute third party products.
- Distributed processing. By improving application development, IBM will try to boost sales of 4300s to end-users.
- Cradle-to-grave service. The IIN will help serve both low and high end customers.

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SEGMENTATION OF PROCESSING SERVICES MARKET, 1981-1986
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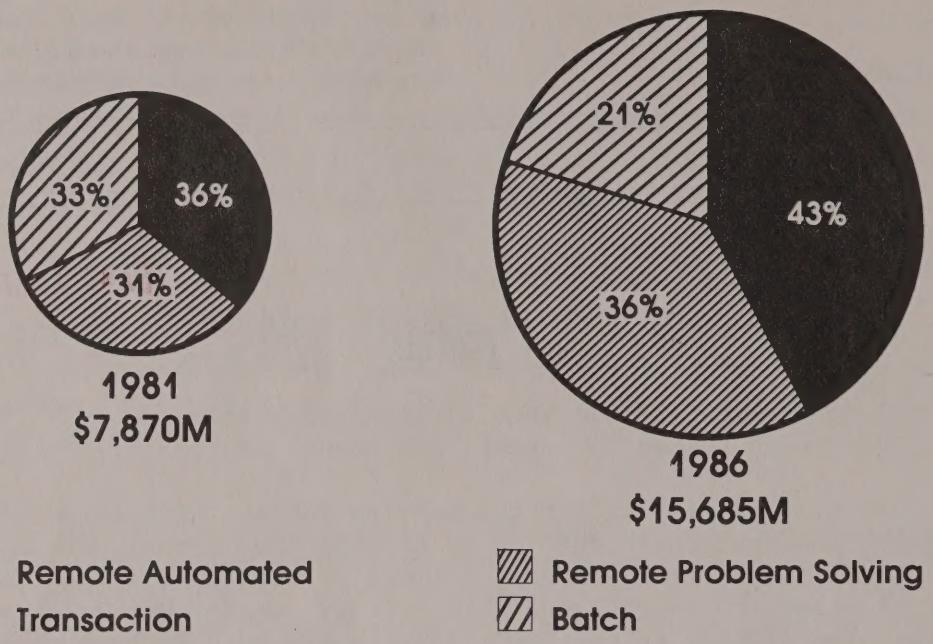

IDC breaks the processing services market into three areas. Remote problem solving includes plain vanilla timesharing as well as application software tools that permit data manipulation. Remote autotransaction includes transaction processing and data base inquiry functions. Batch refers to carry-in, over the counter business. Although the batch market is still considerable, it will only grow at 5% per year through 1986, compared to 18% for remote problem solving and 19% for remote autotransaction.

Remote problem solving ... little talk, lots of growth

Ever since reports that "timesharing is dead" littered the computer publications of the 1970s, the remote problem solving market has been associated with the highly competitive scientific/engineering market, which caters mainly to sophisticated users, and is therefore of somewhat limited potential.

But over the last several years it has become increasingly clear that problem solving services -- such as statistical analysis and graphics -- also appeal to the growing hoards of business end users. Major processing services firms are moving accordingly. General Electric Information Systems, Tymshare, Computer Science Corp., and Rapidata are among those who are deemphasizing their scientific offerings in order to concentrate on the business market.

IBM seems to be following suit. In the IIN release it mentions applications such as financial planning, statistical manipulation, data formatting, and text processing, while not, at least not yet, offering programs such as its popular CADAM CAD/CAM package licensed from Lockheed.

On the business side, problem solving firms have traditionally sold to inexperienced users, often without the involvement of MIS personnel. EDP/IR thinks that IBM may veer away from this pattern. It will probably take advantage of its close ties to large users by selling MIS managers on the need to

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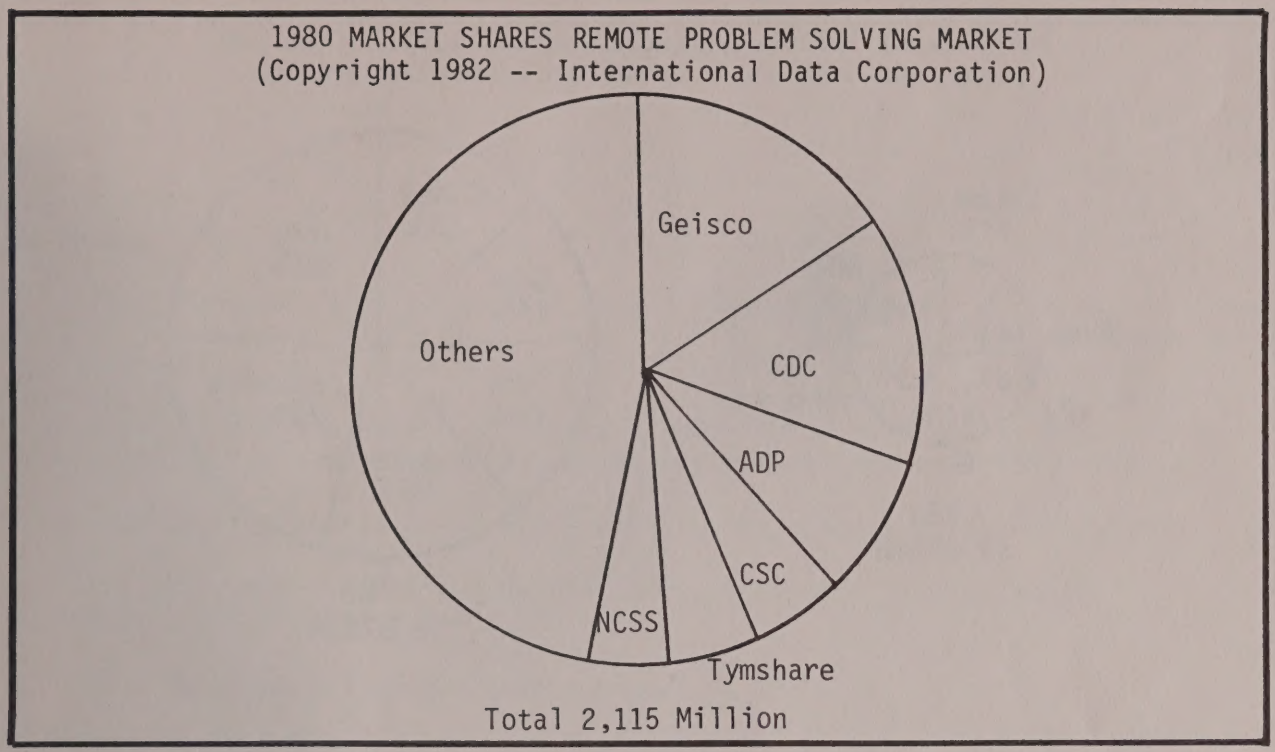

overcome application backlogs. That IBM's hardware salesmen will supplement the IIN's direct marketing force reinforces this view.

It is well known that in many large IBM shops the application backlog can be two years or more. Dismal as this record is, it does not include what is being called the "invisible backlog," desired applications that are never formally requested because the end-user knows that he can't get the results within the necessary timeframe. As businesses become increasingly dependent on their computerized systems, the ability to rapidly develop computer applications can become a decisive competitive edge. The race to get money market funds up and running is a good example.

Thus IBM is stressing its application development tools. As expected, VM, with its interactive CMS facility, is the primary operating system. The IIN is using VM/SP Release 1 and MVS/SP-JES2, Release 1. Yet despite the long list of application and development software, it is easy to see why many have been unimpressed by the initial offering.

A look at the available products shows that most of the IIN is geared toward relatively experienced users. There are only about 15 application programs; more than 20 are operating system functions; seven are for databases and data communications; over 40 concern support of programming languages; eight are conversion aids; and 21 are interactive instruction courses. Typical of the latter is the IBM Information Network Information System II, a collection of information on IBM products for use by DP professionals.

The initial applications are all for VM and include: department reporting; financial planning; APL multivariate time series; the DCF document composition facility; STAIRS, and project analysis and evaluation programs. Certainly there is nothing in this list that will cause any of the IIN's competitors any sleepless nights. If IBM intends to use the IIN to get into the applica- tion software business, then it will have to greatly expand its library.

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REVENUES BY INDUSTRY, REMOTE PROBLEM SOLVING, 1981-86
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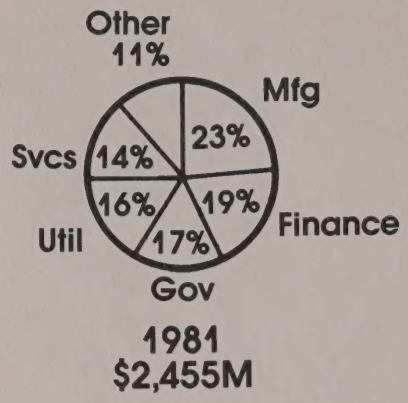

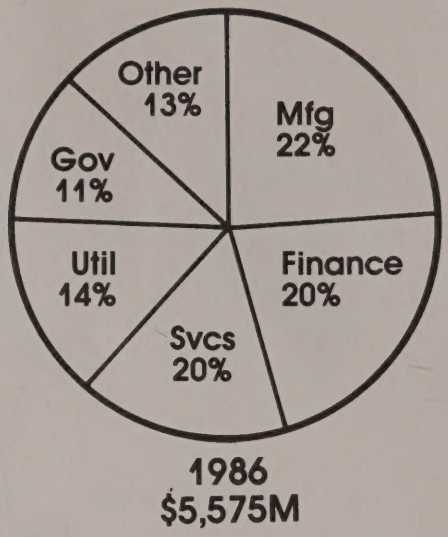

IBM is, of course, well aware that the more applications that are running, the more hardware that will eventually be needed. Thus, it is to its advantage to do whatever it can to speed along the development process. Whether it gets the application software revenues or not, hardware sales should go up, with the 4300 series being the likely benefactor.

All this ties into the "information center" strategy. Information centers consist of a user-controlled CPU -- usually a 4300 -- and a small programming staff that exists outside of the MIS department. The technical personnel act as consultants to end-users, helping them develop their own applications, while giving advice about languages and hardware. Implicit in this strategy is the belief that the 4300 architecture can succeed in an interactive, user-driven environment, a premise questioned by some.

With the IIN, end-users have the option of using IBM's application development tools over the network, then moving the application onto in-house hardware when things are running smoothly. The idea is reminiscent of the on-site mini movement that hit the services industry a few years back.

To give users more flexibility, EDP/IR expects that IBM will add to both the low and high ends of the 4300 family, with VM-based software becoming the key to a small system migration path. Some people are even talking of a VM-based 4300 desktop built around a powerful 16- or 32-bit microprocessor.

Legal controversies

Not everyone is pleased with the IIN. The Association of Data Processing Services Organizations (Adapso) says that it is "distinctly dissatisfied" with the IIN as announced. It says that a preliminary investigation by its lawyers leads them to believe that IBM may still be bound by the provisions of the 1956 Consent Decree that required IBM's Service Bureau Corporation to operate as an "arm's length" fully separate subsidiary.

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1956 FLASHBACKS

It was way back in 1956 that IBM signed a Consent Decree that ended a Justice Department challenge to its dominance of the punched card field. Part of that decree dealt with the Service Bureau Corporation, sold in 1973 to Control Data for $16 million and renamed the Service Bureau Company. As part of the deal with CDC, IBM agreed to stay out of the services business for six years.

That agreement expired in 1979, but it wasn't until the antitrust suit was out of the way that IBM made its move. EDP/IR doubts that legal barriers will do in the IIN, but in case the Consent Decree does turn out to be still in effect, EDP/IR presents the following provisions of the 1956 decree which could effect the IIN service. Before sinking into the legal details, it is worth noting that the present IIN arrangement meets none of 1956 criteria.

"(b) The Service Bureau Corporation shall be enjoined and restrained from:

(1) using any corporate name containing the words International Business Machines or IBM.

(2) employing any person also employed by IBM ...

(3) ... subleasing space from IBM at the locations of more than 20% of its bureaus.

(c) The Service Bureau Corporation shall be ordered and directed to:

(1) maintain in accordance with good accounting practice, separate and complete corporate records and accounts which shall be audited annually by independent public accountants.

(2) charge for services rendered by it prices based upon rates which fairly reflect all expenses properly chargeable thereto provided, however, that nothing herein contained shall prevent the Service Bureau Corporation from reducing any price to meet an equally low price of a competitor.

(e) IBM is hereby enjoined and restrained from furnishing to the Service Bureau Corporation any tabulating or electronic data processing machines except upon the same terms, conditions and delivery schedules that such machines are furnished to any other service bureau.

(f) IBM is hereby ordered and directed to furnish, upon written application and at reasonable and non-discriminatory charges, to any person engaged, or proposing to engage, in the operation of a service bureau using IBM machines copies of any pamphlets, books of instruction or other similar documents which it furnishes to the Service Bureau Corporation relating to the operation and application of IBM tabulating or electronic data processing machines for service bureau business."

IBM's position is that the industry has changed drastically since 1956 and that the Consent Decree refers only to the old batch processing environment. By denying that it is in the services business, IBM seems to be indicating that it will fight against any attempt to impose unusual restrictions upon its business, and given its record in the courts, who would bet against them?

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IBM is calling the IIN a separate business unit, putting it on the same level as National Accounts on the organization chart. An Adapso spokesman told EDP/IR that this does not eliminate the type of cross-subsidization it feels is unfair. Specifically, it objects to the fact that the IIN will be selling software developed by IBM, and that even in the future, the IIN will not have to bear the expense of developing its own software.

Equally important, the trade group objects to the fact that, even though the IIN will have a separate marketing force, IBM hardware salesmen will also be hawking the IIN. Since many of these salesmen also sell to the IIN's competitors, Adapso feels that IIN might have an unfair knowledge of its competitors plans. IBM's position is that there will be cooperative marketing, but that the hardware people will not be selling the IIN "per se."

Adapso says it does not want to have to go to court (where it has been many times in the past). It is talking with IBM, which is an Adapso member, and it is also making the judiciary committees of Congress aware of the issue. It says that given the current environment, it does not expect much help from the Department of Justice. Adapso plans to announce a formal statement of its position within the next six to eight weeks.

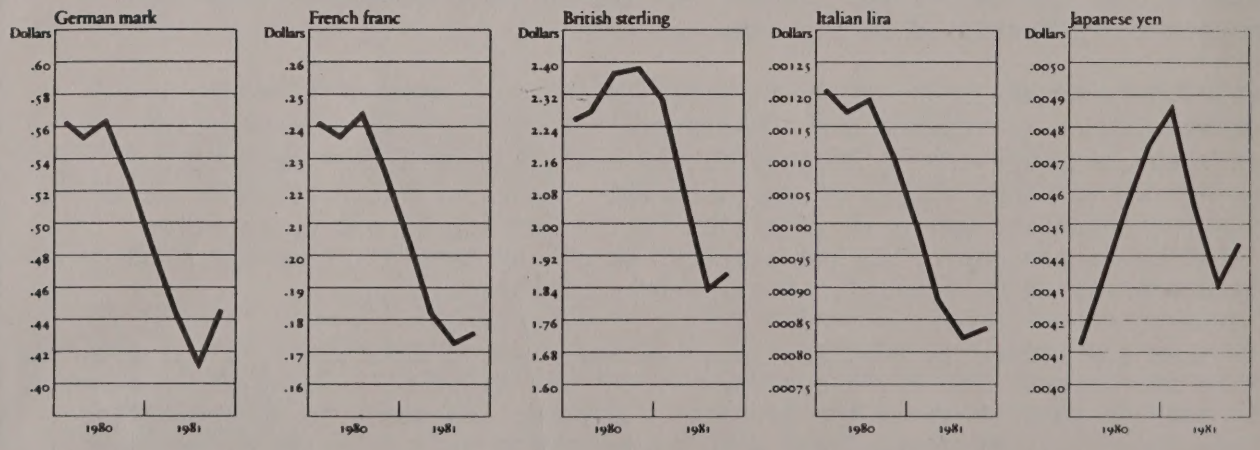
MAINFRAMERS HAVE BAD YEAR, CDC ONLY REAL WINNER

The giants of the industry are still licking their wounds after 1981, a year of recession, high interest rates, currency fluctuations, and layoffs. Only Control Data, with its heavy emphasis on peripherals, add-on memory and services, managed to avoid the downturn.

Europe was the chief target of the vendor finger pointing. Not only did mainframe sales in Europe fall off due to a continent-wide recession, but currency devaluations versus the dollar eroded what little profits there were.

A look at the exchange rates for the last 24 months shows that the dollar appreciated from 15% to 30% against major European currencies. In 1981 even the Japanese yen fell noticeably. Details are provided in the chart below.

Foreign Exchange Rates, U.S. Dollar Equivalents



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MAINFRAME VENDORS 1981 FINANCIAL PERFORMANCE
(Copyright 1982 -- International Data Corporation)

	$M Rev. 81	$M Rev. 80	%Δ	$M Net Earnings 1981	$M Net Earnings 1980	%Δ	Rev. Earnings 1981	Rev. Earnings 1980
Burroughs	3,405	2,902	17.0%	149	82	82.0%	22.8	35.3
Univac*	2,781	2,552	9.0	-	-	-	-	-
NCR	3,432	3,322	3.2	208	255	-18.4	16.5	13.0
CDC*	3,101	2,791	11.1	120	92	30.4	25.8	30.3
Honeywell*	1,774	1,634	7.8	158	184	-14.1	11.2	8.8
IBM	29,070	26,213	9.8	3,308	3,562	-7.1	8.7	7.3
Amdahl	443	394	11.0	27	15	80.0	16.4	26.2

* CDC, Honeywell, and Sperry revenues are for computer businesses only. Sperry does not break out the earnings of its main divisions. Univac's data is for calendar year 1981, though the company's fiscal year ends March 31.

The dramatic exchange rate changes between mid 1980 and the third quarter of 1981 tell a lot of the story. Burroughs estimates that currency translation factors reduced its net earnings by approximately $1/share. Since Burroughs' 1981 earnings/share were $3.58, it is claiming that earnings would have been 28% higher if the currency situation had been neutral.

IBM's European/Mideast/Africa revenues (the lion's share of which are from Europe) fell 7% to $9.7 billion, but its earnings fell 50% to $758 million. IBM says that a neutral currency environment would have boosted net earnings by $600 million, keeping them roughly at 1980 levels, instead of the actual 7% decline. IBM's United States business managed to grow about 20% reaching $16.9 billion; U.S. earnings were up 21% to $2 billion.

Thus, the European situation does seem to be the heart of the industry's financial woes. The problem for the mainframe vendors is that the European sluggishness is expected to continue at least through the first half of 1982. The currency situation is also not likely to improve since U.S. interest rates are not expected to fall drastically from the current 15%-17% range.

Company details

Although Sperry does not break out its computer earnings, its third quarter corporate earnings fell 40%, and the nine months ending December 31 showed a drop of 57.4%; corporate revenues were up 3.8% over the same nine-month period. Univac contributes about 50% of the corporate revenue. Burroughs' situation improved over the dismal numbers of 1980s, but per share earnings levels are still way below the levels of the late 1970s. The Detroit mainframer also had its first $1 billion quarter. CDC says increased margins and lower effective tax rates were enough to offset currency effects. NCR says it expects similar earnings problems for at least the first half of 1982.

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• NEW CHIPS ON THE WAY. Intel, Bell Labs, and Hewlett-Packard kicked off the new year with major chip announcements. In a move that could stem the momentum of Motorola's 68000 microprocessor, Intel has announced the iAPX 286 microsystem, based on the 80286 processing unit. The 80286 includes memory management, virtual address translation, and multi-level protection all on the same chip. Intel claims the 80286 is up to six times faster than the 8086, while addressing sixteen times as much physical memory (16 million bytes) and 1 billion bytes virtual. The 80286 is software compatible -- without modification -- with both the 8086 and 8088; it will also support Multibus. Sampling will begin in the third quarter, with a price of $237 for 100-piece quantities. AMD and Siemens have been announced as second sources. Intel believes the 80286 is best suited for real time, multiuser, and multitasking systems.

Bell Labs described an improved version of its 32-bit microprocessor and a 256K RAM at this years's International Solid State Circuits Conference (ISSCC). Western Electric will begin making the 256K chips later this year, and says that they can be manufactured with exisitng equipment with only a few modifications needed. The 32-bit chip, called the BELLMAC-32A, can support Unix, and is now running in laboratory systems.

Not to be outdone at the ISSCC was Hewlett-Packard which says that it has refined the 32-bit chip it announced about a year ago at the same conference. The chip is now coupled with an I/O processor and memory controller, and it is expected to be initially applied in a desktop system for technical workers. The chip reportedly has the power of an IBM 4300 size processor.

• SEARS CALLS BUSINESS CENTERS A "SUCCESS." Saying that its five retail stores have "exceeded our expectations," Sears has announced plans to open some 45 additional centers this year. 17 new market areas are being targeted with the stores primarily in suburban locations.

• DEC TELLS OF MULTIPROCESSOR VAX. The new VAX-11/782 is a tightly coupled attached processor consisting of two VAX-11/780s and a single MA780 memory subsystem. A basic configuration of two 780 CPUs, two MA780 memory controllers, 124MB of disk storage, tapedrive, multiplexer, console, and VAX/VMS operating system is priced at $395,000. Upgrades of 780s go for $180,000. Upgrades will begin in June, with shipments of full systems scheduled for early summer.

• NIXDORF SAILS INTO THE WIND. Given IBM's aggressive 4300 pricing and the troubles of the 4300 PCMs, Nixdorf's decision to enter the 4300 market in the U.S. took courage if nothing else. The 8890 series which has been sold in Germany since 1980 consists of the models 30, 50, and 70 which are comparable to the IBM 4331-11, 4331-2, and 4341-10. Nixdorf is also selling its own operating system (NIDOS/VSE) and software, and is initially targeting the users of Computer Science Corp.'s EDOS; CSC was acquired by Nixdorf in 1979.

• AT&T GIVES DIVESTITURE DETAILS. Ma Bell plans to spin off her 22 operating companies (OCs) into seven independent regional firms. No surprises here: the groupings will ease worries about the soundness of individual OCs without causing the controversy of advocating a single OC. Each OC will have its own stock and CEO, and the firms will be "roughly comparable" in assets. All seven OCs are expected to be larger than GTE, previously the number two U.S. telco.

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MOLLY UPTON, EDITOR FEBRUARY 4, 1982 • VOL.17,NO.20 P.J. MCGOVERN, PUBLISHER

Japanese desktop forecast -- Page 5

TANDY BANKS ON 68000, ENTERS SMALL BUSINESS SYSTEM MARKET; 16-BIT DESKTOP RACE IS ON

Like the Japanese in the 1950s, Tandy Corp.'s Radio Shack division has been saddled with a reputation for catering to the lowest of the low end, matching bargain prices with limited-function battleship gray boxes more suggestive of model toys than office equipment. Not surprisingly then, despite its market position, Tandy desktops have not exactly taken the Fortune 500 by storm.

But the freewheeling Texas marketeer may have caught its competition flat-footed. A major January 19, announcement puts Tandy into the high-end desktop and low-end small business computer marketplaces. Its dual processor system threatens to dislodge IBM's Personal Computer from the top of the major desktop vendor price/performance heap, and its low price could make SBC vendors wince. The machines even come in slick new ivory-colored cases. Highlights of the new Model 16 are listed below.

- The CPU contains a 16-bit Motorola 68000, as well as an 8-bit Z-80 allowing for compatibility with existing 8-bit Radio Shack software. The two processors provide users with a needed upgrade path, while enabling buyers to wait for 68000 software to come to market.

- Up to two dumb DT-1 terminals made by Tandy can be hung off the Model 16. Tandy claims the 68000 can handle three programs concurrently, with the Z-80 being used to handle all I/O.

- SNA and bisynch communications coupled with Arcnet compatibility should help sales to large organizations concerned with terminal/host and peer-to-peer communications.

The multi-user system can be seen as the first major vendor salvo in the battle between high-end desktops and low-end small business and minicomputers. The 68000 communicates to the outside world in a 16-bit mode, but its inner workings are 32-bit, offering minicomputer like power. Tandy expects to do well in the SBC market, and low-end small business computer vendors like Wang, NCR, Data General and many others will have to take note, since the Model 16 offers the new power at desktop prices of between $5,000 and $12,000.

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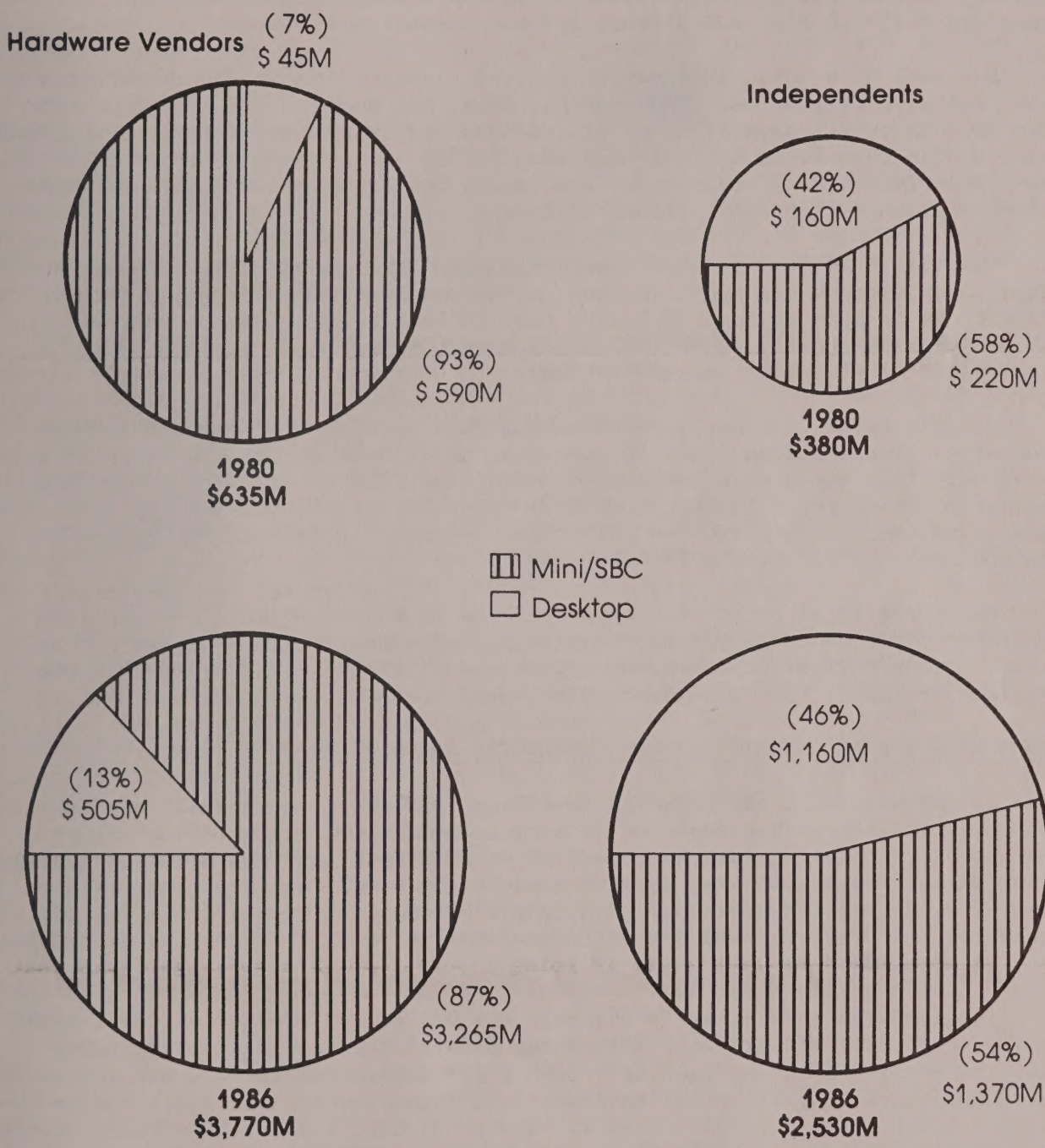

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But there is no doubt that opportunities in this area will abound. IDC expects that operating systems, compilers, languages, program development aids, communications software, utilities and applications software will grow as fast or faster than desktop hardware over the next five years.

COMMODORE STAKES CLAIM TO GENERIC DESKTOPS; JAPANESE VENDORS GO FOR 8086

One of the ways that the Japanese have been expected to wend their way into the U.S. desktop market would be to market the desktop equivalent of plug-compatible machines. Just as an Amdahl or an Hitachi can produce hardware to run IBM mainframe software, desktop vendors could make machines that emulate Apple, Tandy, or IBM desktops. The center of competition would then shift away from software to hardware price/performance, a court where the Japanese are accustomed to scoring a lot of points.

Coupled with this strategy has been the oft stated prediction that, eventually, computer software will follow the path of the record album by being able to be played on any machine. Such a development would commence an era of true mass marketing where the hardware is a commodity and consumers are no longer locked into a single hardware vendor. Vendor loyalty then would become a matter of customer satisfaction, not entrenched investment.

Perhaps then it is no surprise that both of these developments seem to be coming true, but what is of note is that the leader may turn out to be an American firm. Commodore Computer says it will develop a personal computer that can emulate those of Tandy, Apple, and IBM, with a price tag of less than $1,000 for the CPU.

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The story broke in the Wall Street Journal (WSJ), which managed to get Commodore vice president Jack Tramiel to talk about the future when he was attending the recent Consumer Electronics Show. Since then, Commodore has been bombarded with phone calls, but it will only say that the WSJ story is accurate and that Commodore will deliver its version of a PCM desktop. A spokesman added that Mr. Tramiel let the news slip before Commodore had planned, and the company is not prepared to deal with specific questions at this time. According to the WSJ story, the product is expected to be on the market by September.

All that is known of the Commodore approach is that it will put "special circuitry" into the back of each computer that will enable it to read and operate instructions from the other vendor's disks. The technical challenges involved are considerable. Certainly the idea of emulating a single vendor's desktop has been kicked around for some time, but the idea of emulating three machines using three different operating systems and microprocessors has left many observers with a "show me" attitude.

If Commodore can deliver, it will have the immediate edge of being able to offer the largest library of software in the industry. But perhaps more importantly, it would change the nature of the desktop industry and significantly quicken the pace of price cuts and hardware innovation.

Just as with larger computers, the investment in software not only makes users less likely to switch vendors, but also allows vendors to pad prices a bit and spread out its introductions of new models. To put the issue in perspective, consider what IBM's mainframe price/performance levels would be today if Amdahl and the other PCMs weren't around.

If the desktop computer market were to suddenly shift to look more like TVs and stereos, the survivors would be those with the lowest manufacturing costs, best quality and the most reliable service/distribution arrangements, the first two areas being virtually synonymous with the phrase "Japanese competition." By preannouncing its product, Commodore has grabbed more attention than it's ever known in the U.S. and laid a lot of its reputation on the line, but if it delivers, the rewards and the consequences could be great.

Japanese market outlook and forecast

It is impossible to write about the desktop market without looking over one's shoulder at the Japanese. Desktop activity in Japan is as frenetic as it is in the U.S., and the winners in Japanese domestic competition almost inevitably turn out to be world class competitors, if not market lords.

Lest anyone still harbor illusions about a monolithic Japanese corporate/government facade, IDC Japan has counted at least 21 vendors of desktop computers and dozens more in the small business market. Price wars have already become fierce, with many computer retailers cutting price by 40% to 50% in order to clear inventories and make room for new machines.

As in the U.S., business users are somewhat put off by the limitations of 8-bit systems, and vendors are quickly bringing 16-bit systems to the market. Interestingly, almost all of the 16-bit machines introduced so far have been based around Intel chips, an indication of the influence that IBM decisions have on Japanese manufacturers and a tribute to Intel marketers. (According

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16-BIT PERSONAL COMPUTER MODELS BY JAPANESE MANUFACTURERS

Supplier	Model	CPU	Main Memory ROM	Main Memory RAM	Auxiliary Memory	CRT	Keyboard	Interface	Software	Date Announced	Date Shipment	Price (Min. Configuration) ¥K
Anritsu	Packet 68000	MC 68000	16KB	128KB-368KB	MiniFD 300KBx1					5/81	9/81	1,150
Chuo Electronic	CEC 8000	Z 8000	4KB	128KB-256KB	FD 1.2MBx2 Disk 10MB-40MB	12" monochrome	JIS	RS232C IEEE 488	Pascal, BASIC, FORTRAN, Assembler, UNIX	9/81		2,673
Fujitsu	FACOM 9450	MN 1610A	4KB	124KB	5"FD 320KBx2 8"FD 243/486/985KBx1	12" monochrome	JIS	RS232C	BASIC, EPOCALC	10/81	10/81	980
NEC	N 5200/05	i 8086	-	128KB	14"FD 1MBx4	12" monochrome	JIS	RS232C	COBOL, BASIC	7/81	12/81	798
Mitsubishi	MP-1601	i 8088	2KB	128KB	5"FD 320KBx2	12" monochrome	JIS	RS232C	BASIC, COBOL, FORTRAN	12/81	4/82	730
	MP-1602	i 8088	2KB	192KB	5"FD 320KBx2	12" monochrome	JIS	RS232C	BASIC, COBOL, FORTRAN	12/81	4/82	930
	MP-1605	i 8088	2KB	256KB-384KB	5"FD 320KBx2	12" color (8)	JIS	RS232C	BASIC, COBOL, FORTRAN	12/81	4/82	1,230
SEIKO	SEIKO 9500	i 8086 i 8087	8KB	256KB, 512KB	5"FD 640KBx2	14" color (8)	JIS	RS232C IEEE 488	BASIC, FORTRAN, PASCAL, RMX186	10/81	10/81	2,280
Sord	M 416	i 8086 Amd 9512	-	256KB-1MB	Winchester 10M/20M/40MB	14" color (8)	JIS	RS232C IEEE	PIPS, BASIC, Assembler	4/81		3,760

8-BIT PERSONAL COMPUTER MODELS BY JAPANESE MANUFACTURERS

Supplier	Model	CPU	Main Memory ROM	Main Memory RAM	Auxiliary Memory	CRT	Keyboard	Interface	Software	Date Announced	Date Shipment	Price (Min. Configuration) ¥K
Canon	BX-1-II		25KB	-	5"FD 65.5KBx1	single line	JIS	BCD	BASIC	7/81	7/81	880
Casio	FX9000P	Z80A	12KB -24KB	-	CMOS RAM (4KB) with power supply	5.5" monochrome	ASCII	RS-232C	BASIC	3/81	3/81	149
Fujitsu	MICRO 8	MBL6809	42KB	64KB	Bubble Cassette 32KBx2, MiniFD 328KBx4	12" color (8)	JIS	IEEE-488	BASIC	5/81	7/81	231.5
Hitachi	Basic Master Level 3	HD6809	24KB	32KB	5"FD Audio Cassette	12" monochrome 14" color (8)	JIS	-	BASIC	5/81	7/81	466
Matsushita	MyBrain 850M	8085A	64KB	-	8"FD 1MBx2	12" monochrome	JIS	RS-232C	BASIC, FORTRAN	5/81	5/81	2,480
NEC	PC-8800	UPD780C-1	72KB	64KB	5"FD 320KBx4 FD 1MBx4	12" color (8)	JIS	RS-232C	BASIC	10/81	10/81	228 (CPU only)
Oki	if800 Model30	Z-80B	2KB	128KB	FD 1MBx2	12" monochrome	JIS	RS-232C	BASIC	11/81	2/81	1,498
Sanyo	FDS-1000	Z-80A	2KB	64KB	5"FD 320KBx1	12" monochrome	JIS/ASCII	-	BASIC, COBOL, FORTRAN PASCAL	5/81	9/81	398 (OEM Sample)
Sharp	MZ-80B	LH008A	4KB	64KB	5"FD 572KBx4	10" monochrome	ASCII	RS-232C	BASIC, PASCAL	3/81	4/81	278
Sord	M23	Z-80A	4KB	64KB	5"FD 572KBx2	12" monochrome	JIS	RS-232C IEEE-488	BASIC, PASCAL	5/81	5/81	258 (CPU only)
Toshiba	Pasopia	Z-80A	32KB	64KB	5"FD 280KBx4	12" color (8)	JIS RS-232C		BAISC, PASCAL	10/81	10/81	168 (CPU only)

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to IDC's EDP Japan Report, IBM will commence sales of its personal computer in Japan in the early part of this year, primarily as a terminal in DDP systems.) In the 8-bit realm, the Z-80 has been the most popular choice.

Despite all the talk about lagging U.S. office worker capitalization, surveys by leading Japanese office equipment vendors show investment in office worker equipment in Japan is only about half that of the U.S. figure of about $2,000/per worker, and thus Japanese desktop vendors are targeting the office market with great enthusiasm.

As for numbers, IDC Japan has forecasted that in terms of units shipped the domestic Japanese desktop market will grow at a compound rate of 59% through 1985, reaching an annual figure of 558,000. Exports are expected to grow at a 109% rate over the same period, reaching 407,000 units by 1985. A simple extrapolation of these figures shows that the Japanese will reach their traditional goal of exporting 50% of production well before decade's end.

END-USER DESKTOP COMPUTER SHIPMENTS BY UNITS, JAPANESE MFGRS.
(Copyright 1982 International Data Corporation)

Year	Domestic	% Growth	Exports	% Growth	Total	% Growth
1980	55,770	-	10,230	-	66,000	-
1981	108,750	95%	25,500	149%	134,250	103%
1982	198,000	82	54,060	112	252,060	88
1983	316,600	60	119,000	120	435,600	73
1984	455,000	44	226,100	90	681,100	56
1985	558,000	23	407,000	80	965,000	42
Compound annual growth		59%		109%		71%

Apple slices

Through all this activity, Apple Computer has been rather quiet. But the company that made desktop computers a household word continues to grow in leaps and bounds and has big plans for the next 18 months.

A recent Business Week story told of several key new products with the following code names and characteristics: Lisa, a low cost ($7,000 to $10,000) version of Xerox's user-friendly Star; Super II, an improved and lower priced version of the popular Apple II; and Mackintosh, an entry into the low-end personal computer market. Apple would not comment on the article except to say that if there were serious disagreements with anything in the article, it would have made them known. The spokesman confirmed that the next 18 months would see major new product announcements; the company does not want to rush products to market too quickly, as it did with the beleaguered Apple III.

As to its next microprocessor selection, Apple would not comment. It is widely rumored that Apple will also go for the 68000, and the published statements of Motorola officials have not discouraged such thinking.

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• IBM REENTERS SERVICES INDUSTRY. The grand strategy for the '80s continues to unfold. A DP center in Tampa, FLA will be the heart of the IBM Information Network which will have VM, DOS/VSE and MVS systems linked to 3705 controllers in Atlanta, Dallas, Chicago, San Francisco, New York City, and Washington, D.C. Other cities will be added in time. To access the network, users will need only a 3101, 3270, Personal Computer, Datamaster, Displaywriter or compatible terminal. Over 100 IBM software programs will be available and IBM seems to be emphasizing the center for remote problem solving, application development and program testing tasks. IBM withdrew from the services industry in 1973, when it sold its operations to CDC as part of an antitrust settlement. Information Network marketing commenced February 2, 1982.

• HONEYWELL ADDS TO LIST OF DP LAYOFFS. Some 1,150 people, representing some 6% of Honeywell's Information Systems workforce, have been layed off. Surprisingly, the company did not blame the spreading recession, instead it cited the recent company consolidation and the general need to reduce operating costs. Accordingly, the layoffs consisted of 700 administrative and staff workers at the U.S. Marketing and Services Group and 450 people from operations and support at the Small Systems and Terminal division. Honeywell has now layed off 1,800 workers in the last six months. Reduced white collar overhead is becoming commonplace as the industry attempts to pick up its productivity and profitablity in these lackluster economic times.

• CENTRONICS GETS BADLY NEEDED CASH AND THREE NEW OWNERS. Once the king of the printer market, Centronics has fallen on hard times. In a whopper of a bailout agreement, Centronics has sold 45% of itself to CDC (35%), NCR (4.7%), and ICL (4.7%). In exchange, Centronics will receive $25 million in cash and acquire Computer Peripherals, jointly owned by CDC (60%), NCR (20%), and ICL (20%). Computer Peripherals makes line printers and had annual revenues of about $100 million. Centronics founder Robert Howard says that the move will help the company bring out its stylus-based Quietwriter machines. Perhaps more importantly, by joining forces with Computer Peripherals, Centronics may be better prepared to withstand fierce Japanese competition in the low end market.

• STC/MAGNUSON DEAL FALLS THROUGH. Promises. Promises. Storage Technology continues to play the dashing young suitor that just can't tie the knot. It has now popped the big question to Memorex, Amdahl, and Magnuson, only to pull out at the last moment. The move leaves the stood-up Magnuson both poor and embarrassed, especially since CEO Joseph Hitt has resigned after an unexpectedly high 4th quarter loss of more than $10 million.

STC also has announced a new intelligent controller called the Sybercache (or 8890) which it claims will reduce DASD I/O times by 40% to 75%. The cache consists of from 1.5MB to 12MB of semiconductor memory and supports the current family of STC drives. When asked how the Sybercache differs from the Virtual Storage System announced last summer, STC said that the "VSS is a powerful backend processor, while Sybercache is a DASD go-faster." Both can increase throughput, but the VSS is more concerned with managing sequential data and tape and maintaining recovery capability, while the Sybercache concentrates on I/O performance. STC says it expects the Sybercache to penetrate more sites. It adds that it still doesn't have its hands on an IBM 3380 and thus its 8380 equivalent is at least a year away.

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EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

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Japanese desktop forecast -- Page 5

TANDY BANKS ON 68000, ENTERS SMALL BUSINESS SYSTEM MARKET; 16-BIT DESKTOP RACE IS ON

Like the Japanese in the 1950s, Tandy Corp.'s Radio Shack division has been saddled with a reputation for catering to the lowest of the low end, matching bargain prices with limited-function battleship gray boxes more suggestive of model toys than office equipment. Not surprisingly then, despite its market position, Tandy desktops have not exactly taken the Fortune 500 by storm.

But the freewheeling Texas marketeer may have caught its competition flat-footed. A major January 19, announcement puts Tandy into the high-end desktop and low-end small business computer marketplaces. Its dual processor system threatens to dislodge IBM's Personal Computer from the top of the major desktop vendor price/performance heap, and its low price could make SBC vendors wince. The machines even come in slick new ivory-colored cases. Highlights of the new Model 16 are listed below.

- The CPU contains a 16-bit Motorola 68000, as well as an 8-bit Z-80 allowing for compatibility with existing 8-bit Radio Shack software. The two processors provide users with a needed upgrade path, while enabling buyers to wait for 68000 software to come to market.

- Up to two dumb DT-1 terminals made by Tandy can be hung off the Model 16. Tandy claims the 68000 can handle three programs concurrently, with the Z-80 being used to handle all I/O.

- SNA and bisynch communications coupled with Arcnet compatibility should help sales to large organizations concerned with terminal/host and peer-to-peer communications.

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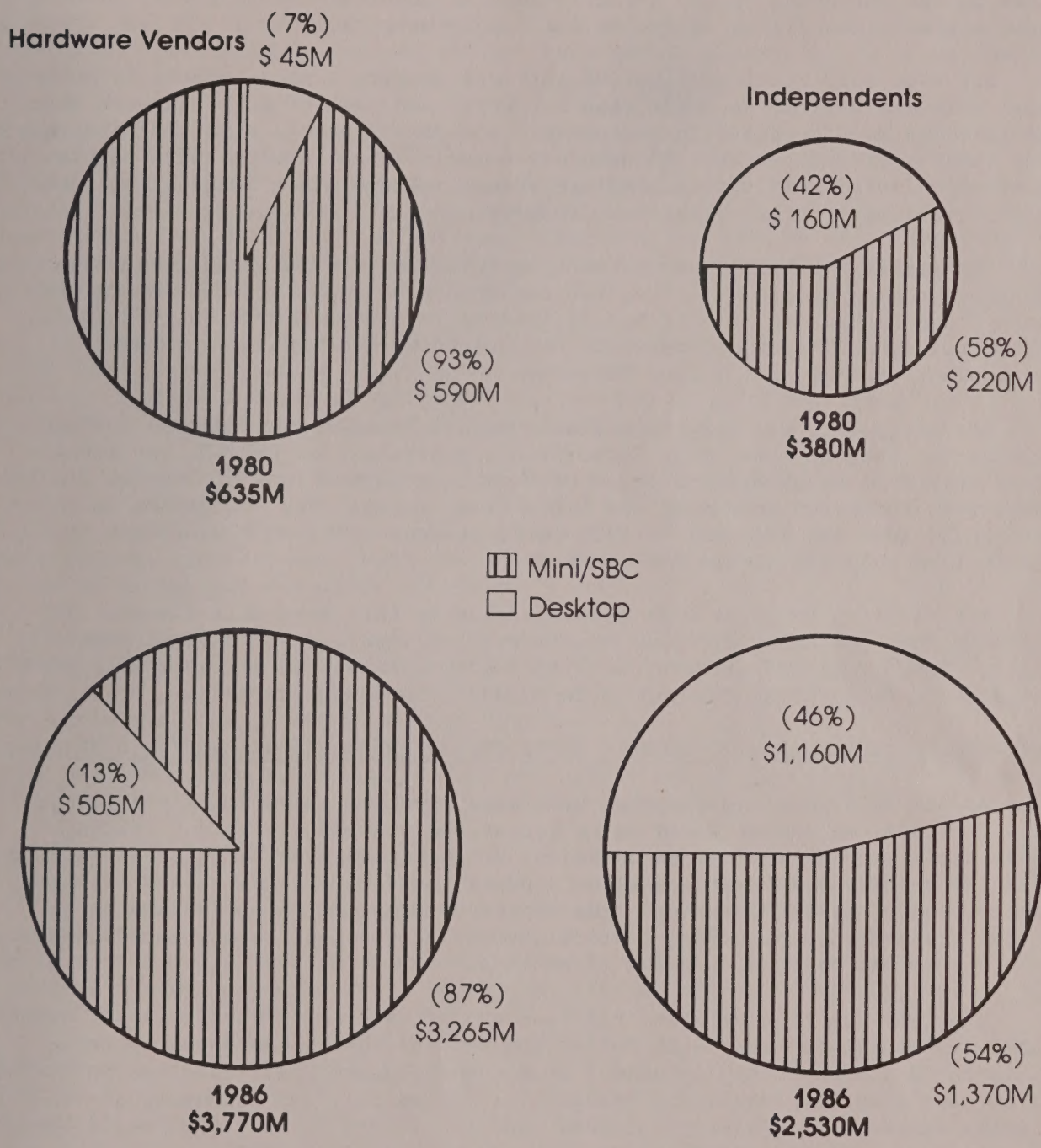

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But there is no doubt that opportunities in this area will abound. IDC expects that operating systems, compilers, languages, program development aids, communications software, utilities and applications software will grow as fast or faster than desktop hardware over the next five years.

COMMODORE STAKES CLAIM TO GENERIC DESKTOPS; JAPANESE VENDORS GO FOR 8086

One of the ways that the Japanese have been expected to wend their way into the U.S. desktop market would be to market the desktop equivalent of plug-compatible machines. Just as an Amdahl or an Hitachi can produce hardware to run IBM mainframe software, desktop vendors could make machines that emulate Apple, Tandy, or IBM desktops. The center of competition would then shift away from software to hardware price/performance, a court where the Japanese are accustomed to scoring a lot of points.

Coupled with this strategy has been the oft stated prediction that, eventually, computer software will follow the path of the record album by being able to be played on any machine. Such a development would commence an era of true mass marketing where the hardware is a commodity and consumers are no longer locked into a single hardware vendor. Vendor loyalty then would become a matter of customer satisfaction, not entrenched investment.

Perhaps then it is no surprise that both of these developments seem to be coming true, but what is of note is that the leader may turn out to be an American firm. Commodore Computer says it will develop a personal computer that can emulate those of Tandy, Apple, and IBM, with a price tag of less than $1,000 for the CPU.

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The story broke in the Wall Street Journal (WSJ), which managed to get Commodore vice president Jack Tramiel to talk about the future when he was attending the recent Consumer Electronics Show. Since then, Commodore has been bombarded with phone calls, but it will only say that the WSJ story is accurate and that Commodore will deliver its version of a PCM desktop. A spokesman added that Mr. Tramiel let the news slip before Commodore had planned, and the company is not prepared to deal with specific questions at this time. According to the WSJ story, the product is expected to be on the market by September.

All that is known of the Commodore approach is that it will put "special circuitry" into the back of each computer that will enable it to read and operate instructions from the other vendor's disks. The technical challenges involved are considerable. Certainly the idea of emulating a single vendor's desktop has been kicked around for some time, but the idea of emulating three machines using three different operating systems and microprocessors has left many observers with a "show me" attitude.

If Commodore can deliver, it will have the immediate edge of being able to offer the largest library of software in the industry. But perhaps more importantly, it would change the nature of the desktop industry and significantly quicken the pace of price cuts and hardware innovation.

Just as with larger computers, the investment in software not only makes users less likely to switch vendors, but also allows vendors to pad prices a bit and spread out its introductions of new models. To put the issue in perspective, consider what IBM's mainframe price/performance levels would be today if Amdahl and the other PCMs weren't around.

If the desktop computer market were to suddenly shift to look more like TVs and stereos, the survivors would be those with the lowest manufacturing costs, best quality and the most reliable service/distribution arrangements, the first two areas being virtually synonymous with the phrase "Japanese competition." By preannouncing its product, Commodore has grabbed more attention than it's ever known in the U.S. and laid a lot of its reputation on the line, but if it delivers, the rewards and the consequences could be great.

Japanese market outlook and forecast

It is impossible to write about the desktop market without looking over one's shoulder at the Japanese. Desktop activity in Japan is as frenetic as it is in the U.S., and the winners in Japanese domestic competition almost inevitably turn out to be world class competitors, if not market lords.

Lest anyone still harbor illusions about a monolithic Japanese corporate/government facade, IDC Japan has counted at least 21 vendors of desktop computers and dozens more in the small business market. Price wars have already become fierce, with many computer retailers cutting price by 40% to 50% in order to clear inventories and make room for new machines.

As in the U.S., business users are somewhat put off by the limitations of 8-bit systems, and vendors are quickly bringing 16-bit systems to the market. Interestingly, almost all of the 16-bit machines introduced so far have been based around Intel chips, an indication of the influence that IBM decisions have on Japanese manufacturers and a tribute to Intel marketers. (According

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16-BIT PERSONAL COMPUTER MODELS BY JAPANESE MANUFACTURERS

Supplier	Model	CPU	Main Memory ROM	Main Memory RAM	Auxiliary Memory	CRT	Keyboard	Interface	Software	Date Announced	Date Shipment	Price (Min. Configuration) ¥K
Anritsu	Packet 68000	MC 68000	16KB	128KB-368KB	MiniFD 300KBx1					5/81	9/81	1,150
Chuo Electronic	CEC 8000	Z 8000	4KB	128KB-256KB	FD 1.2MBx2 Disk 10MB-40MB	12" monochrome	JIS	RS232C IEEE 488	Pascal, BASIC, FORTRAN, Assembler, UNIX	9/81		2,673
Fujitsu	FACOM 9450	MN 1610A	4KB	124KB	5"FD 320KBx2 8"FD 243/486/985KBx1	12" monochrome	JIS	RS232C	BASIC, EPOCALC	10/81	10/81	980
NEC	N 5200/05	i 8086	-	128KB	14"FD 1MBx4	12" monochrome	JIS	RS232C	COBOL, BASIC	7/81	12/81	798
Mitsubishi	MP-1601	i 8088	2KB	128KB	5"FD 320KBx2	12" monochrome	JIS	RS232C	BASIC, COBOL, FORTRAN	12/81	4/82	730
	MP-1602	i 8088	2KB	192KB	5"FD 320KBx2	12" monochrome	JIS	RS232C	BASIC, COBOL, FORTRAN	12/81	4/82	930
	MP-1605	i 8088	2KB	256KB-384KB	5"FD 320KBx2	12" color (8)	JIS	RS232C	BASIC, COBOL, FORTRAN	12/81	4/82	1,230
SEIKO	SEIKO 9500	i 8086 i 8087	8KB	256KB, 512KB	5"FD 640KBx2	14" color (8)	JIS	RS232C IEEE 488	BASIC, FORTRAN, PASCAL, RMX186	10/81	10/81	2,280
Sord	M 416	i 8086 Amd 9512	-	256KB-1MB	Winchester 10M/20M/40MB	14" color (8)	JIS	RS232C IEEE	PIPS, BASIC, Assembler	4/81		3,760

8-BIT PERSONAL COMPUTER MODELS BY JAPANESE MANUFACTURERS

Supplier	Model	CPU	Main Memory ROM	Main Memory RAM	Auxiliary Memory	CRT	Keyboard	Interface	Software	Date Announced	Date Shipment	Price (Min. Configuration) ¥K
Canon	BX-1-II		25KB	-	5"FD 65.5KBx1	single line	JIS	BCD	BASIC	7/81	7/81	880
Casio	FX9000P	Z80A	12KB -24KB	-	CMOS RAM (4KB) with power supply	5.5" monochrome	ASCII	RS-232C	BASIC	3/81	3/81	149
Fujitsu	MICRO 8	MBL6809	42KB	64KB	Bubble Cassette 32KBx2, MiniFD 328KBx4	12" color (8)	JIS	IEEE-488	BASIC	5/81	7/81	231.5
Hitachi	Basic Master Level 3	HD6809	24KB	32KB	5"FD Audio Cassette	12" monochrome 14" color (8)	JIS	-	BASIC	5/81	7/81	466
Matsushita	MyBrain 850M	8085A	64KB	-	8"FD 1MBx2	12" monochrome	JIS	RS-232C	BASIC, FORTRAN	5/81	5/81	2,480
NEC	PC-8800	UPD780C-1	72KB	64KB	5"FD 320KBx4 FD 1MBx4	12" color (8)	JIS	RS-232C	BASIC	10/81	10/81	228 (CPU only)
Oki	if800 Model130	Z-80B	2KB	128KB	FD 1MBx2	12" monochrome	JIS	RS-232C	BASIC	11/81	2/81	1,498
Sanyo	FDS-1000	Z-80A	2KB	64KB	5"FD 320KBx1	12" monochrome	JIS/ASCII	-	BASIC, COBOL, FORTRAN PASCAL	5/81	9/81	398 (OEM Sample)
Sharp	MZ-80B	LH008A	4KB	64KB	5"FD 572KBx4	10" monochrome	ASCII	RS-232C	BASIC, PASCAL	3/81	4/81	278
Sord	M23	Z-80A	4KB	64KB	5"FD 572KBx2	12" monochrome	JIS	RS-232C IEEE-488	BASIC, PASCAL	5/81	5/81	258 (CPU only)
Toshiba	Pasopia	Z-80A	32KB	64KB	5"FD 280KBx4	12" color (8)	JIS RS-232C		BAISC, PASCAL	10/81	10/81	168 (CPU only)

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to IDC's EDP Japan Report, IBM will commence sales of its personal computer in Japan in the early part of this year, primarily as a terminal in DDP systems.) In the 8-bit realm, the Z-80 has been the most popular choice.

Despite all the talk about lagging U.S. office worker capitalization, surveys by leading Japanese office equipment vendors show investment in office worker equipment in Japan is only about half that of the U.S. figure of about $2,000/per worker, and thus Japanese desktop vendors are targeting the office market with great enthusiasm.

As for numbers, IDC Japan has forecasted that in terms of units shipped the domestic Japanese desktop market will grow at a compound rate of 59% through 1985, reaching an annual figure of 558,000. Exports are expected to grow at a 109% rate over the same period, reaching 407,000 units by 1985. A simple extrapolation of these figures shows that the Japanese will reach their traditional goal of exporting 50% of production well before decade's end.

END-USER DESKTOP COMPUTER SHIPMENTS BY UNITS, JAPANESE MFGRS.
(Copyright 1982 International Data Corporation)

Year	Domestic	% Growth	Exports	% Growth	Total	% Growth
1980	55,770	-	10,230	-	66,000	-
1981	108,750	95%	25,500	149%	134,250	103%
1982	198,000	82	54,060	112	252,060	88
1983	316,600	60	119,000	120	435,600	73
1984	455,000	44	226,100	90	681,100	56
1985	558,000	23	407,000	80	965,000	42
Compound annual growth		59%		109%		71%

Apple slices

Through all this activity, Apple Computer has been rather quiet. But the company that made desktop computers a household word continues to grow in leaps and bounds and has big plans for the next 18 months.

A recent Business Week story told of several key new products with the following code names and characteristics: Lisa, a low cost ($7,000 to $10,000) version of Xerox's user-friendly Star; Super II, an improved and lower priced version of the popular Apple II; and Mackintosh, an entry into the low-end personal computer market. Apple would not comment on the article except to say that if there were serious disagreements with anything in the article, it would have made them known. The spokesman confirmed that the next 18 months would see major new product announcements; the company does not want to rush products to market too quickly, as it did with the beleaguered Apple III.

As to its next microprocessor selection, Apple would not comment. It is widely rumored that Apple will also go for the 68000, and the published statements of Motorola officials have not discouraged such thinking.

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• IBM REENTERS SERVICES INDUSTRY. The grand strategy for the '80s continues to unfold. A DP center in Tampa, FLA will be the heart of the IBM Information Network which will have VM, DOS/VSE and MVS systems linked to 3705 controllers in Atlanta, Dallas, Chicago, San Francisco, New York City, and Washington, D.C. Other cities will be added in time. To access the network, users will need only a 3101, 3270, Personal Computer, Datamaster, Displaywriter or compatible terminal. Over 100 IBM software programs will be available and IBM seems to be emphasizing the center for remote problem solving, application development and program testing tasks. IBM withdrew from the services industry in 1973, when it sold its operations to CDC as part of an antitrust settlement. Information Network marketing commenced February 2, 1982.

• HONEYWELL ADDS TO LIST OF DP LAYOFFS. Some 1,150 people, representing some 6% of Honeywell's Information Systems workforce, have been layed off. Surprisingly, the company did not blame the spreading recession, instead it cited the recent company consolidation and the general need to reduce operating costs. Accordingly, the layoffs consisted of 700 administrative and staff workers at the U.S. Marketing and Services Group and 450 people from operations and support at the Small Systems and Terminal division. Honeywell has now layed off 1,800 workers in the last six months. Reduced white collar overhead is becoming commonplace as the industry attempts to pick up its productivity and profitablity in these lackluster economic times.

• CENTRONICS GETS BADLY NEEDED CASH AND THREE NEW OWNERS. Once the king of the printer market, Centronics has fallen on hard times. In a whopper of a bailout agreement, Centronics has sold 45% of itself to CDC (35%), NCR (4.7%), and ICL (4.7%). In exchange, Centronics will receive $25 million in cash and acquire Computer Peripherals, jointly owned by CDC (60%), NCR (20%), and ICL (20%). Computer Peripherals makes line printers and had annual revenues of about $100 million. Centronics founder Robert Howard says that the move will help the company bring out its stylus-based Quietwriter machines. Perhaps more importantly, by joining forces with Computer Peripherals, Centronics may be better prepared to withstand fierce Japanese competition in the low end market.

• STC/MAGNUSON DEAL FALLS THROUGH. Promises. Promises. Storage Technology continues to play the dashing young suitor that just can't tie the knot. It has now popped the big question to Memorex, Amdahl, and Magnuson, only to pull out at the last moment. The move leaves the stood-up Magnuson both poor and embarrassed, especially since CEO Joseph Hitt has resigned after an unexpectedly high 4th quarter loss of more than $10 million.

STC also has announced a new intelligent controller called the Sybercache (or 8890) which it claims will reduce DASD I/O times by 40% to 75%. The cache consists of from 1.5MB to 12MB of semiconductor memory and supports the current family of STC drives. When asked how the Sybercache differs from the Virtual Storage System announced last summer, STC said that the "VSS is a powerful backend processor, while Sybercache is a DASD go-faster." Both can increase throughput, but the VSS is more concerned with managing sequential data and tape and maintaining recovery capability, while the Sybercache concentrates on I/O performance. STC says it expects the Sybercache to penetrate more sites. It adds that it still doesn't have its hands on an IBM 3380 and thus its 8380 equivalent is at least a year away.

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EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"The Gray Sheet"

MOLLY UPTON, EDITOR JANUARY 19, 1982 ● VOL.17,NO.19 P.J. MCGOVERN, PUBLISHER

REAGAN ADMINISTRATION OPTS FOR LAISSEZ-FAIRE; AT&T UNLEASHED; IBM UNTARNISHED

January 8, 1982 was just another Friday until the Department of Justice and the Reagan administration launched the regulatory equivalent of the Enola Gay.

By late afternoon the news had struck: the 13 year old suit against IBM was termed "without merit" and dropped, and the seven year suit against AT&T was dismissed in return for an update of the 1956 Consent Decree. The latter agreement will, if unchanged, allow AT&T to enter into any and all unregulated markets, and result in the biggest shift in corporate assets since the break up of the Standard Oil trust in 1911.

The IBM decision was a surprise to no one, except those who insisted that Justice would find a way to save face, but no corner of the industry will be untouched by the proposed AT&T agreement. However, events are still unsettled since Judge Harold Greene -- who is emerging as an admirable ringmaster -- is giving the public a 60-day comment period before the agreement is effective, and Congress may yet have a voice.

The agreement would give AT&T those very elements it has fought so hard to protect in the various restructuring attempts of 1934 and 1956: the profitable Long Lines division, Bell Laboratories, its reknowned research and development facility, and Western Electric, its manufacturing arm. In return, AT&T agreed to spin off its low profit, high overhead operating companies. Some thoughts:

- Now that there are no holds barred, will AT&T and IBM actually go after one another's turf or will they continue to keep a respectful distance from each other's monopoly interests?

- Acquisitions by both IBM and AT&T are now more likely, but both are likely to be quiet until the dust has settled a bit.

- AT&T has kept its eyes focused on the home; it retains the rights to all customer premises equipment as well its 1,800 phone stores.

- IBM's falling overall computer industry market share and the existence of some 200 U.S. computer manufacturers -- compared to less than twenty in 1969 -- helped justify DOJ's decision.

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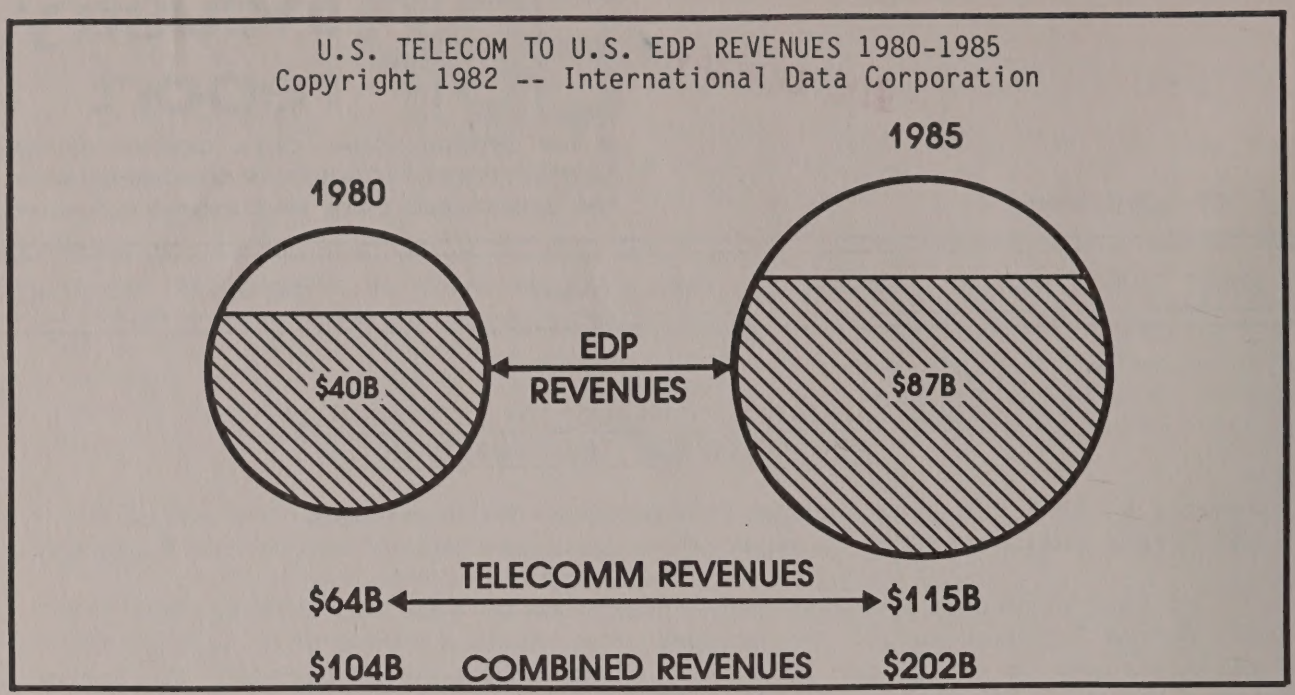

Highlights of the AT&T Consent Decree Modification

- AT&T will be allowed to enter unregulated markets including local markets as long it doesn't reinvest in operating companies.

- AT&T will hold on to its 1,800 phone stores and be responsible for all customer premises equipment. It will also keep control of the Yellow Pages, a lucrative business worth nearly $3 billion a year.

- Best estimates are that AT&T will transfer some $80 billion in assets to its operating companies, but these assets currently produce less than half of AT&T's annual revenue.

- AT&T is to submit within six months its detailed divesture plan, clearing up ambiguities over interexchange traffic definitions, access charges, stockholder compensation, and operating company organization. A spokesman for AT&T said this plan will be reviewed by Judge Greene, but didn't know if public commentary would be solicited.

- Operating companies are supposed to treat specialized carriers such as MCI and Southern Pacific Communications (SPCC) the same as AT&T, meaning if you dial "1" to make a long distance call through AT&T, then you should be able to dial "2," or an equivalent to use and MCI line.

- Operating companies will be allowed to regroup any way they want, including forming one company again, but they will only be able to provide regulated, monopoly services.

EDP/IR sees Bell as a big winner in the settlement. The Antitrust suit was not going well; it promised to drag on, and a possible defeat would have been extremely damaging for AT&T, encouraging lots of suits by independents and risking divestiture on DOJ's terms. Despite Chairman Charles Brown's insistence that it did not want to lose the Bell Operating Companies (BOC's), it was AT&T that made the final push for the announced settlement.

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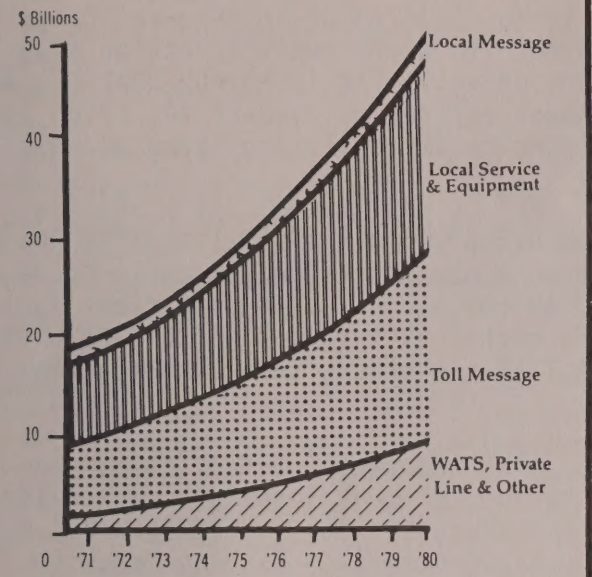
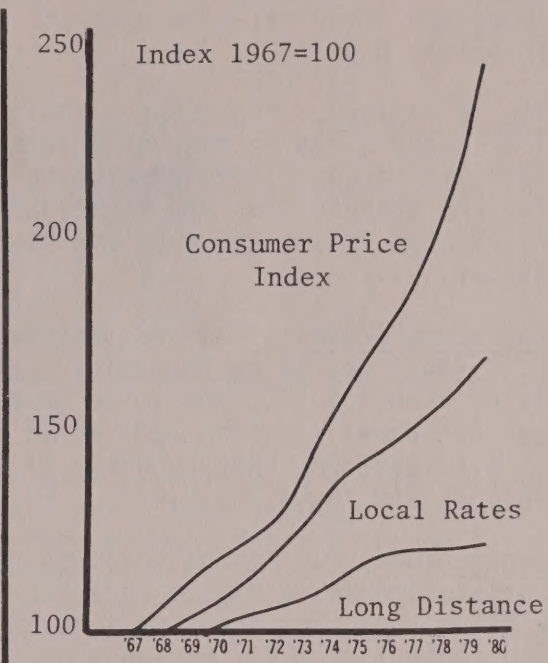
BELL SYSTEM REVENUES AND RATES
(Source: AT&T 1980 annual report)





The operating companies have not contributed much to company profits, and AT&T wanted to avoid having to deal with 50 state regulatory offices for any new offerings. Additionally, in 1980 AT&T forked over $12 billion from its Long Lines revenue to help subsidize BOC rates. How much of this amount stays with the BOC's through new access charges will be the chief determinant of how fast local rates will rise. EDP/IR still believes that Congress will remain committed to some subsidization of local rates, especially for rural areas. An MCI spokesman told EDP/IR that his company would object if access charges are made artificially high in order to subsidize local rates.

By shedding the operating companies, AT&T has stripped the opposition of its main reason for blocking AT&T from becoming an electronic publisher. Arguments maintaining that the company that delivers the information should not also provide it, will no longer hold once the BOC's are divested. Unless special interests can convince Congress to pass specific provisions, AT&T will be free to enter any videotex markets it wishes to pursue.

Despite the grand sweep of the agreement, lots of regulatory questions remain. Most observers believe that both the House bill 5158 and Senate bill 898 are now somewhat obsolete, and will require substantial revision. Additionally, the Computer Inquiry II decision will probably be given a second look by the FCC, and some observers believe that AT&T may argue that the need for a fully separate unregulated subsidiary no longer exists.

But it must be remembered that nothing in the proposed settlement would alleviate the main reason for requiring a separate subsidiary. There is still the danger that Long Lines monopoly profits could cross-subsidize new service operations. Separate operating companies have nothing to do with that issue. Though DOJ is claiming victory, a Business Week photo of DOJ employees wearing "reach out and crush someone" T-shirts perhaps gives a more accurate picture.

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WHAT THE DECREE ACTUALLY SAYS

Running the risk of weighing down its readers with the yoke of legalese, EDP/IR offers these selected excerpts from the January 8, 1982, "Stipulation For Voluntary Dismissal."

• The settlement. "Pursuant to Rule 41 (a)(1))(ii) of the Federal Rules for Civil Procedure, the parties stipulate that the above entitled action (U.S. vs. AT&T) is hereby dismissed without prejudice." "It is hereby ORDERED, ADJUDGED, AND DECREED that the Final Judgment entered on January 24, 1956, is hereby vacated in its entirety and replaced by the following items and provisions: ...."

• The divestiture. "The transfer from A.T.&T. and its affiliates to the B.O.C.'s (Bell Operating Companies), or to a new entity subsequently to be separated from A.T.&T., and to be owned by the B.O.C.'s, of sufficient facilities, personnel, systems and rights to technical information to permit the B.O.C.'s to perform, independently of A.T.&T., exchange telecommunications and exchange access functions ...."

• Separation. "... there shall be no joint ownership of facilities, but appropriate provision may be made for sharing, through leasing or otherwise, of multifunction facilities so long as the separated portion of each B.O.C. is ensured control over the exchange telecommunications and exchange access functions; ...."

• Equal access. "... each B.O.C. shall provide to all interexchange carriers and information service providers exchange access, information access and exchange services for such access on an unbundled, tariffed basis that is equal in type, quality and price to that provided to A.T.&T. and its affiliates."

• Equal treatment. "No B.O.C. shall discriminate between A.T.&T. and its affiliates and their products and services and other persons and their products and services in the: 1. Procurement of products and services; 2. Establishment and dissemination of technical information and procurement and interconnection standards; 3. Interconnection and use of the B.O.C.'s telecommunications service and facilities or in the charges for each element of service; and 4. Provision of new services and the planning for and implementation of the construction or modification of facilities used to provide exchange access and information access."

• B.O.C. reorganization. "... the B.O.C.'s may support and share the costs of a centralized organization for the provision of engineering, administrative and other services which can most efficiently be provided on a centralized basis. The B.O.C.'s shall provide, through a central organization, a single point of contact for coordination of B.O.C.'s to meet the requirements of national security and emergency preparedness."

• B.O.C. restrictions. "... no B.O.C. shall, directly or through any affiliate enterprise: 1. Provide interchange telecommunications services or information services; 2. Manufacture or provide telecommunications products or customer premises equipment (except for provision of customer premises equipment for emergency services); or 3. Provide any other product or service, except exchange telecommunications and exchange access service, that is not a natural monopoly service actually regulated by tariff."

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BELL SYSTEM OPERATING REVENUES, 1978-1980 ($M)

	1980	1979	1978
Local Service			
Service and equipment charges	18,972	16,872	15,652
Message charges	2,184	2,173	1,987
Public telephones	800	778	712
Private lines and other services	491	384	332
Toll service			
Message charges	20,083	18,231	16,325
WATS	3,724	3,175	2,745
Private Lines and other services	2,325	1,964	1,699
Directory advertising and miscellaneous	2,702	2,288	1,880
Less: Provision for uncollectables	494	459	342
Total operating revenues	50,791	45,408	40,993

Key issues in the Bell settlement

• What will happen to Bell Labs? As the proud parent of the semiconductor, the laser, and the bubble memory, the subsidized free-wheeling work of one of the world's largest research organizations has served this country well. As part of the 1956 Consent Decree, the fruits of all Bell Lab research were required to be licensed to the public at "reasonable rates." Under the new agreement, Bell will license its work at its discretion, just like any other profit-seeking firm. Current work at Bell Labs includes: optical technology, X-ray lithography for chips, and advanced word and voice processing: AT&T claims that Bell Labs now spends 30% of its R&D money on software development.

There are two issues involved here. The existing facilities and personnel were put together under the monopoly framework. The Bell Labs technical staff alone consists of nearly 15,000 workers. To hand this knowledge and capital base over to AT&T without any obligations to the public makes for a nice head start for the new AT&T since new products will benefit from monopoly work.

Secondly, EDP/IR wonders if Bell Labs can maintain its pursuit of pure research in a more profit and loss environment. If it can't, the nation as a whole might suffer. Those who complain about Japanese government sponsored research should consider the amount of play money lavished on Bell Labs over the years by both phone users and the military. Where would the computer industry be today if Bell had kept all its work in-house?

• Does AT&T see itself as a service or manufacturing company, or both? Does Ma Bell really want to get locked in fierce hardware competition for things like desktop computers, terminals, office equipment, or even merchant semiconductors, or does it see itself using its built-in telecommunications edge by emphasizing services such as those promised by the Advanced Communications Service (ACS), electronic mail, electronic publishing, teleconferencing, facsimile, cable TV, etc? Is any company strong enough to go all out at both?

• Will AT&T go after the cable TV business? While cable represents an attractive future outlet for both home and business information services, EDP/IR thinks that this ship is rapidly passing by. Contracts are going fast with from 80% to 90% of the nation expected to be wired by the end of the decade. Since many of the cable leaders are giants in their own right, the acquisition path would not be an easy one. If AT&T is going to be a major force in CATV, it will have to move fast, an option that may not be open.

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IBM REMAINS KING OF THE COURTS WITH BEST OF ALL POSSIBLE VICTORIES

If the truth be told, much of the industry wasn't eager to see the Justice Department split up IBM, which was the original remedy for the giant's alleged monopolistic sins. Users have had enough problems with the product line confusion created by the three divisonal set-up and have traditionally looked to IBM to set whatever de facto standards the industry enjoys. Competitors, on the other hand, might actually prefer to deal with a ponderous monolith rather than two or three fit and fast-moving units under IBM command.

From the government's perspective, with alarm over the strengths of Japanese computer firms reaching the highest citadels of power and with the Reagan administration's free-market convictions, it soon became clear that this was no time to start overhauling the computer industry flagship.

What does the end of the suit against IBM mean to the rest of the industry? Probably not too much immediately; IBM has been behaving as if it won the suit for some time now, and with the reorganization, the new MVS extended architecture, the personal computer, et al, it has a relatively firm course charted for the next few years. Certainly, the giant will be more free to play hardball if it chooses, either through bundled prices, volume sales, or predatory tactics, and acquisitions are now more of a possibility. Some areas we're likely to see a more competitive IBM:

- Office -- IBM has done an excellent job of confusing customers with its various incompatible product lines. The corporate reorganization is a big step forward in eliminating such unorganized efforts, as well as confusion over which part of a customer is whose account.

- Communications -- Though the initial FCC approval demanded that IBM keep an arms length relation with Satellite Business Systems (SBS), IBM could enter the digital termination service (DTS) market, joining the nine entrants now planning to provide alternatives to Bell's local loops. A hookup with IBM at the local site and SBS for the long distance voice/data/video traffic seems feasible.

  IBM may finally enter the private branch exchange (PBX) market in the U.S. (it already markets PBXs in Europe). If one believes that AT&T and IBM had a friendly agreement not to step on each other's toes, then one can conclude that because AT&T can now play in different fields, IBM will feel free to venture into PBXs or any other area that meets its ROI criteria. IBM already has a voice store-and-forward system based on the Series/1.

- Services -- Check processing in Florida is the latest hot rumor. The most likely approach will be either a specific industry orientation, or the acquisition of a major processing services firm with communications expertise -- something on the order of a Tymshare.

- Nontraditional selling methods -- more OEMing, volume discounts, and selling without a salesperson. IBM has been increasing its use of discounts upward from the Series/1 to the 4300 line, and it has also expanded the variety of products sold through dealers. Some suggest that the prepackaged 4321 and the SSX operating system is the first step back toward bundled hardware/software products.

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DOLLAR VALUE, INTERNATIONAL AND U.S. COMPUTER SHIPMENTS, 1970

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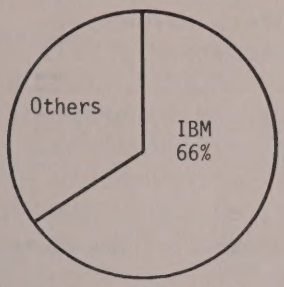
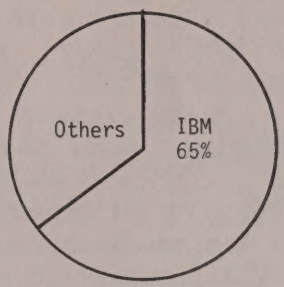
General Purpose International



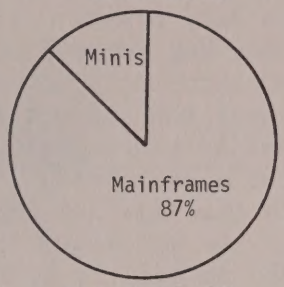
Total $2,916M

General Purpose U.S.



Total $4,371M

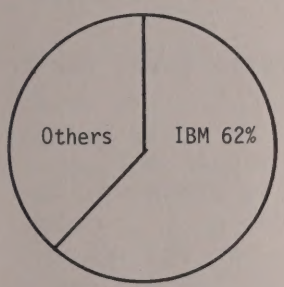
General Purpose/Minis Worldwide



Total $7.8B

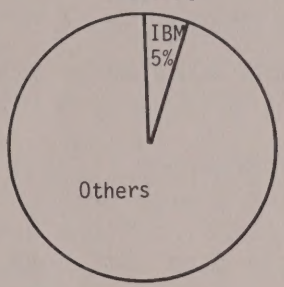
DOLLAR VALUE, 1980 WORLDWIDE SHIPMENTS, IBM VS. NON-IBM

General Purpose



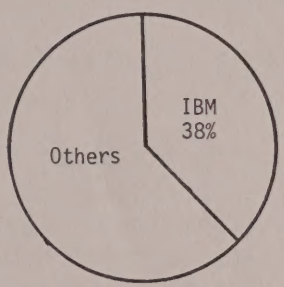
Total $17B

Minis



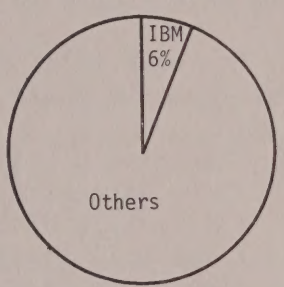
Total $5B

SBCs



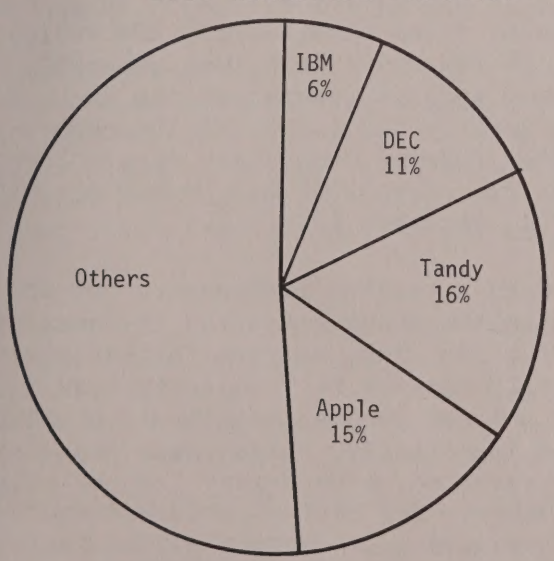
Total $3.2B

Desktops

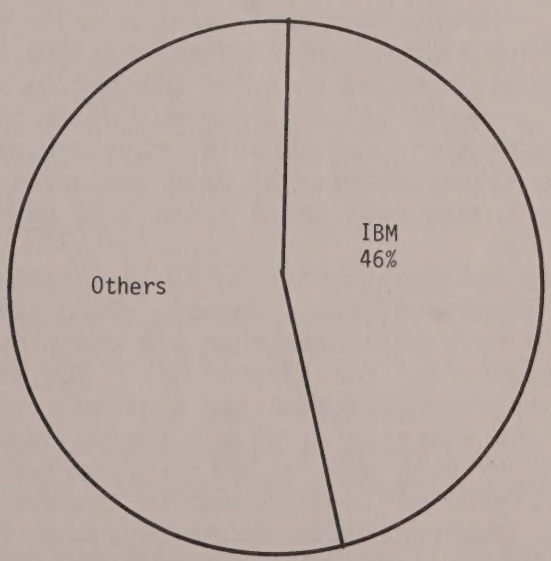


Total $1.7B

1980 WORLDWIDE PROCESSOR SHIPMENTS, IBM MARKET SHARES



689,445 Units



$26.7 B

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"And time may well be the DOJ's most ruthless foe. After a while in such a long drawn out affair a certain entropy must take hold. Memories dim, papers dissemble, staffs turn over, expertise dissipates and motivations flag." EDP/IR, February 27, 1975

"...Perhaps the biggest fly in the ointment is the government's lack of a businessman's point of view. Time is not of the essence. No one makes a calculated risk analysis -- weighing the chance of a less complete case against the benefits of quicker redress -- and conservatism is the watchword." -- Bernard Nash, counsel for the Hart Subcommittee on Antitrust, EDP/IR February 28, 1977

Yes, the suit was lengthy -- 13 years almost to the week, from the closing days of the Johnson administration to a year into that of Ronald Reagan. The trial was also lengthy to the point of disbelief, commencing May 19, 1975, it stretched almost six years, although in the last year courtroom activity had virtually ground to a halt.

In April 1976, EDP/IR calculated that based on progress to date, the trial could last 10 years.

"Admittedly this is "worst case" mathematics ... but even if all those witnesses aren't called, or IBM's side of the case picks up, or the lawyers discontinue their objections, motions and so on . . . the trial will still last an outrageously long time. And when it's finally settled, what then? Will the industry be recognizable? Can a decision based on the data processing environment of the 1960s relate to life in the 1980s?"

The trial even consumed its participants -- lawyers for both sides, clerks, staffs, and reporters. Virtually the only key faces present at both the opening statement and the final denouement belonged to Judge David N. Edelstein and the lead attorney representing IBM, Thomas Barr.

"The Justice Department case is being tried before Judge Edelstein, very eminent and very experienced. He heard the 1952 case against IBM, approved the 1956 Consent Decree, and has supervised its enforcement and compliance. He is thoroughly familiar with IBM, knows more about EDP industry than any other Federal Judge, and surely recognizes the present case not only as the largest of his career but probably the last big one." -- EDP/IR, December 29, 1972.

By all rights Edelstein was entitled to a relaxed retirement, but the IBM case wiped out that prospect. Ghoulish as the thought may be, it occurred to EDP/IR more than once that IBM was playing for time, waiting for Edelstein to disappear from the scene. Why? Not simply because he frequently took exception to the conduct of the IBM lawyers, and not because he himself would take over the questioning of witnesses. More importantly, there never was a stipulation by both parties of the material presented, a necessity for the trial to be transferred in midstream to another judge. Had Edelstein lacked the staying power, the trial would have gone back to square one! EDP/IR wishes Edelstein a rewarding retirement and wonders about the fate of the mountains of industry dirt and documentation that surfaced as evidence.

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EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"The Gray Sheet"

MOLLY UPTON, EDITOR JANUARY 8, 1982 ● VOL.17,NO.18 P.J. MCGOVERN, PUBLISHER

Justice Drops IBM Suit, Settles AT&T -- Page 8

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1981 ACQUISITIONS -- HARDWARE NECESSITY, SERVICES OPPORTUNITY

With all the talk about the 1980s being the software decade, perhaps it is fitting that 1981's acquisitions in the service/software market point toward the future, while those on the hardware side seem designed to make the best out of the past.

With the exception of Motorola's enigmatic acquisition of Four Phase, major takeovers on the hardware side of the business, i.e. Magnuson and Memorex, were more driven by bad numbers on the balance sheets and low prices than by the allure of fast growth in the future.

In contrast, International Data Corporation has identified some one hundred 1981 acquisitions in the services and software industry. Although hardly on a scale with the struggles for Conoco and Marathon oil, IDC estimates that in 1981 more than $1 billion was spent taking over value-added firms.

And despite, or perhaps because of, record high interest rates, the pace of these acquisitions continues to accelerate. As recently as 1977, IDC could only find 33 acquisitions. Since then the numbers read 48, 78, 96, 100+ for the 1978-81 period. But as there are now some 4,400 firms in the value-added marketplace, concentration is the least of the industry's worries..

Because value-added firms offer specialized talent and services, they will continue to make attractive acquisition candidates. Software and services companies have been acquired for their personnel strengths such as strong management, programming skills, and industry expertise, or for strategic reasons such as expansion of market share, vertical integration, gateways to new markets, and geographical expansion. Among the highlights and trends for 1981:

- Firms with manufacturing and CAD/CAM knowhow are hot targets; in previous years, those offering data bases and gateways to consumer markets were the main focus.

- Software firms and processing services firms are being bought up in equal numbers; the latter had almost a 2:1 edge in years past.

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LARGEST ACQUISITIONS IN THE VALUE ADDED MARKETPLACE,
(1977-1981)

Buyer	Company Acquired	Year	Price ($M)
Allied Corp.	Bunker Ramo	1981	358*
Schlumberger	Applicon	1981	222
Schlumberger	Manufacturing Data Systems	1981	189
American Express	Warner Cable	1979	175
Dun & Bradstreet	National CSS	1980	165
McGraw-Hill	Data Resources Inc.	1980	103
General Electric	Calma	1981	100
Burroughs	System Development Corp.	1981	98
Kodak	Atex	1981	79
McAuto	Microdata	1979	73
GTE	Telenet	1979	60
American Express	First Data Resources	1980	55
United Telecommunications	Insurance Systems of America	1981	41**
Prentice Hall	Deltak	1979	35
Becton-Dickinson	Telemed	1980	30+
United Telecommunications	On-Line Systems	1979	30+
National Data Corp.	Rapidata	1981	24
H&R Block	CompuServe	1980	23
Anacomp	DSI Corp.	1981	21
Xerox	Autex Service Corp.	1980	20+
UCC	Digital Systems of Fla.	1980	16
Computer Science Corp.	3 units of Data Serv. (Itel)	1979	16
CGA Computer Assoc.	Allen Services Corp.	1981	16
Automatic Data Processing	Audatex Division (Itel)	1980	15
Chase Manhattan	Computer Power	1980	15+

* Processing services account for about $50 million of Bunker Ramo revenues.
**Announced, but not yet finalized.

It is worth noting that virtually all of the larger acquisitions were initiated by firms ouside of the services/software industry. Although large service companies have acquired numerous value-added suppliers over the last few years, most of these have been relatively small. ADP has bought 26 firms since 1977, Anacomp 19, and Tymshare 12.

The large acquisition target in 1981 was a different type of services firm than in years past. Whereas earlier big moves, such as those by McGraw Hill, Dun and Bradstreet, American Express, and H&R Block, tended to focus on either data bases or links to consumer markets, this year's purchases were heavily geared to manufacturing environments, reflecting the new emphasis on improving industrial productivity through CAD/CAM, robotics, and the like.

Of course not everyone is buying. There has also been a movement toward divestiture as companies try to clarify their image and shed unprofitable segments not essential to their future directions. Comshare sold its tax processing division to ADP; Bradford sold some of its health care and government work to Mcauto; Xerox has sold its Arista Manufacturing Systems division to MSA, and numerous banks have sold off their data processing divisions to value-added firms.

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SEGMENTATION, VALUE-ADDED ACQUISITIONS, 1977-81,
PROCESSING SERVICES VS. SOFTWARE

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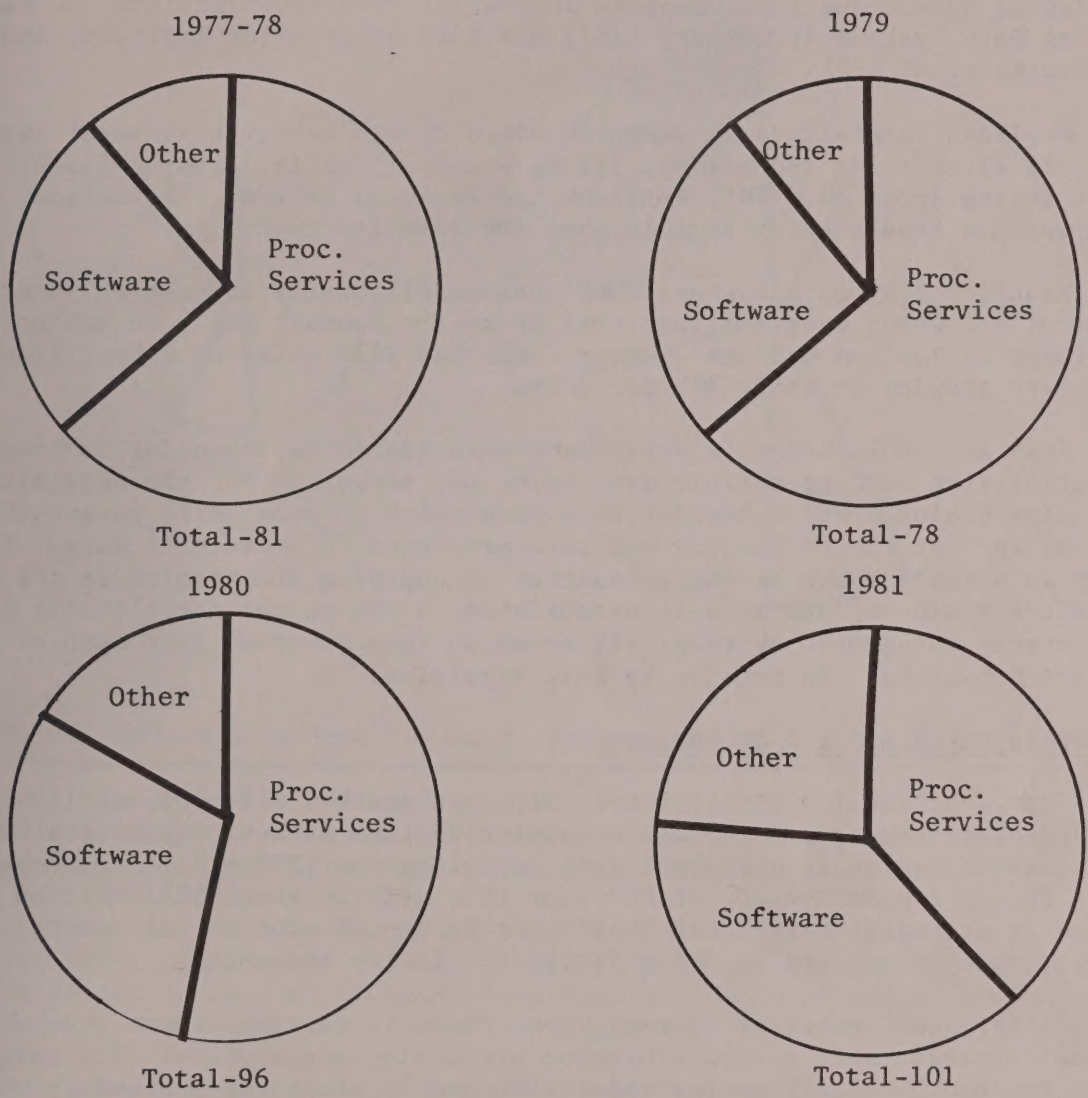

The chart above shows that software firms are becoming increasingly attractive acquisition targets. In 1981, total acquisitions were split equally between processing services and software houses, compared to an approximate 2:1 ratio in 1977.

There are two chief reasons for this. Only recently have independent software houses such as MSA grown to sizes capable of launching major acquisition efforts. Secondly, firms outside of the value-added marketplace have a much higher awareness of the need for in-house software strength, and the expense of starting from scratch.

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Schlumberger boring in on manufacturing market

Over the last three years, Schlumberger with annual revenues of about $5 billion has spent almost $1 billion to improve its high tech expertise. Long admired as the largest and most profitable of the oil services firms, the Netherlands headquartered company has made three major buys: $425 million for Fairchild Camera and Instrument in October of 1979; $189 million for Manufacturing Data Systems in January 1981; and $222 million for Applicon, announced in September of 1981.

Applicon specializes in computer-aided design for architectural, mechanical and electronics industries; its main competitor is Computervision. In the year ending April 30, 1981, Applicon had revenues of some $75 million, and the company has been growing rapidly over the last few years.

Manufacturing Data Systems (MDS) has traditionally focused on numerical control software; over the last year or so the company has been making efforts to focus on low end CAD/CAM systems. MDS had 1980 sales of $56 million and has been growing at about 30% per year.

Thus far Schlumberger's moves seem more geared to improving in-house capabilities than for aggessively developing new markets. But the acquisitions may give Schlumberger a broader base from which to eventually pursue the growing market for the collection and interpretation of industrial data. The company is already known as the pacesetter in applying electronics to its oil services business, and is well established in the market for electric meters and energy management systems. It seems to have realized that much of its existing business can benefit by chip expertise.

Motorola makes bid for DP business

Over the last few months Intel Corp. has grabbed a lot of headlines by making overtures toward the microcomputer systems market. Arch rival Motorola has taken a decidedly different tack, shelling out $253 million to acquire Four Phase, a major vendor of DDP gear that will do about $225 million in business in calendar 1981. Just what Motorola has in mind is not immediately clear, and the company is doing little to clarify the matter.

In terms of number of systems, Four Phase is running almost even with Datapoint for leadership in the clustered processing marketplace. Its main products are the 24-bit IV series models 10 thru 90 clustered processors with between 24KB and 768KB main memory, and the 32-bit 311 and 312 mainframes ranging from 512KB to 4MB memory; Four Phase compares the latter two to the 4331-1 and 4331-2. The 311 and 312 were picked up in the 1980 aquisition of Two Pi.

Four Phase's most recent moves have been toward integrated office/DP systems. Its Corporate Office Management System (COMS IV) is built around either the 311 or 312, and is designed to run IBM software for batch DP applications while handling office functions such as word processing, electronic mail, text and document retrieval, and executive services through Four Phase software. Not only can these machines run IBM software but Four Phase is equipping them with SNA, SDLC, and X.25 communications.

Four Phase does not come to Motorola with its hand out. The company continues to grow at almost 20% per year, and although earnings are down a

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DOLLAR VALUE OF DDP PRODUCT SHIPMENTS 1980 -1985
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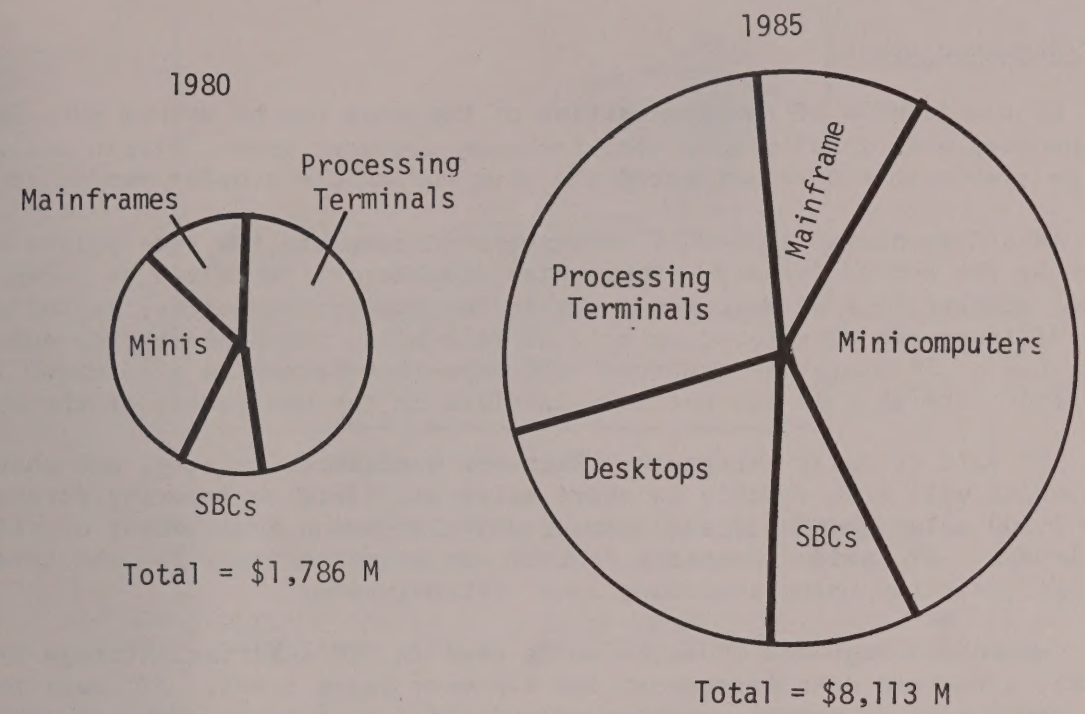

*1980 figures do not show desktops whose percentage was too small to show.

little, this is primarily due to a significant decline in its European business and the expensing of the Two Pi purchase. The company has about 4,000 employees, of which 1,000 are in field support.

IDC estimates that Four Phase has some 70,000 terminals installed as of the end of 1980. Four Phase claims to have shipped some 13,000 system worldwide. It is not a big user of Motorola chips, and no joint sales/service is envisioned; Four Phase says it hopes to wrap up the paperwork by April 1982.

In addition to its $1.2 billion dollar chip business, Motorola also has its 1977 acquisition of Codex to add to the brew. The Codex move has been successful for Motorola; the company has grown from $27 million in 1976 to about $140 million in 1980. Codex's main products include the 6520 front end processor (a 270X/370X plug compatible replacement), as well as a broad line of high-speed modems, multiplexers, communications processors, and related testing and monitoring gear. It currently employs about 1,000 people.

How this heavy dose of IBM compatibility fits together with Motorola's chip business is uncertain. Motorola has said that it will be a "semiconductor, communications, and data processing" company but it is has not said if or when this efforts will be integrated. It seems likely that for its large systems Four Phase would want to take advantage of Codex's front end strength, and that both can benefit from the parent's R&D, financial backing, and general technological expertise.

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Looking further down the road, Motorola may see desktops based around the 68000 as fitting into distributed systems capable of communicating with IBM. And if nothing else, Motorola is picking up a significant installed base of equipment, a viable and growing company, a crash introduction to the world of IBM computers, and a solid base for future scheming.

STC/Magnuson update

If the details of the acquisition of Magnuson can be worked out, Storage Technology will finally have some in-house computer power, albeit not the large system that once attracted the plug compatible storage vendor to Amdahl.

An STC spokesman said that it expects to complete the fine points of the deal by the end of January, after which stockholder votes can be taken. The major stockholders of Magnuson are said to support the merger, including its key officers and directors, as well as Fairchild, the Schlumberger subsidiary that has a 13% share of Magnuson. STC says that Fairchild's interest is as an investor, and that it has not been involved in the management of the company.

STC said it fully expects key Magnuson management to stay, and that the companies will move rapidly to share sales and field engineering forces. STC has 2,500 sales and field engineerss, while Magnuson has a total of only 600 employees. STC said it expects to keep the Magnuson name "for the time being," possibly using something like "STC/Magnuson."

Currently, Magnuson CPUs are being used in STC's Virtual Storage System (VSS), a backend data management box for very large users. STC says that the VSS machine is extremely complicated and still very much in the testing stage, with less than five test sites. It added that it does not expect to commence volume sales of the VSS until the end of 1982.

As the distributed processing market continues to expand, IDC has found a significant number of small mainframes and desktops wending their way into DDP networks. By 1985 these two new sectors will form a large segment of the market, and thus Four Phase's purchase of Two Pi and its acquisition by Motorola give it a stronger position from which to pursue new market opportunities.

MORE PRICE HIKES FROM IBM, AND A FEW CURVE BALLS, TOO

With the cost of inflation running at about 9%, IBM is probably coming out ahead with its policy of semiannual price hikes. This time around lease and rental went up about 8%, purchase prices about 4%, and maintenance charges up to 15%; most other prices were increased in the 8% to 10% range.

But perhaps more interesting is the giant's apparent confusion in its 4300 pricing policy. When IBM introduced its new models of the 4300 series last November it cut prices on the existing 4300 line from between 10% and 17%. Of note is the fact these cuts came only six months after a price hike!

Typical is a 2M byte 4341-1 that went from $257,000 in 12/80 to $270,000 in 6/81, and then way down to $225,000 in November of 1981. In other words, a 5% rise followed by a 17% drop. Pity the user who bought between July and November of 1981. Leasing prices stayed the same between June and December, greatly increasing purchase incentive by lowering the purchase-lease ratio from 38 in June to 31 in November for a 4341-1.

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PURCHASE AND MAINTENANCE PRICES, IBM 4300 SERIES, 1979-81
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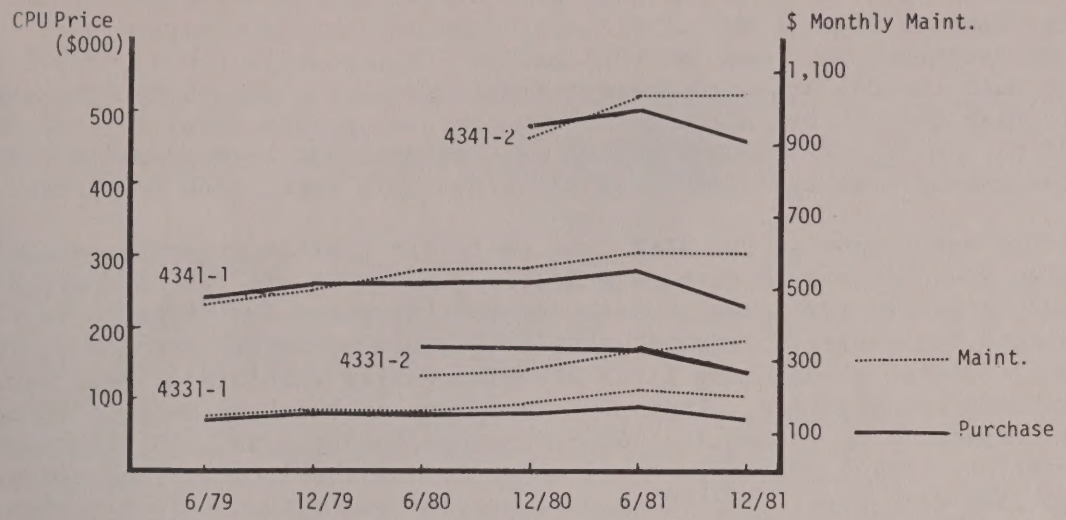

PURCHASE, LEASE AND MAINTENANCE PRICES, IBM CPUS
(June 1980 to December 1981, except as noted)

Model	Price ($000)		%Δ	Lease ($000)		%Δ	MMC($)		%Δ
	Old	New		Old	New		Old	New	
3033U (8MB)	2,825	2,113	-25%	96	105	+9	7,800	6,105	-22%
3032 (4MB)	1,392	990	-28	55	54	-2	6,020	4,360	-27
3031 (4MB)	784	638	-19	35	38	-9	2,785	2,195	-21
4341-2 (8MB)*	479	453	-5	13	14	+7	914	1,035	+13
4341-1 (2MB)	257	225	-8	6.7	7.6	+13	547	601	+10
4331-2 (2MB)	165	141	-15	4.7	5.0	+6	250	355	+42
4331-1 (1MB)	76	71	-7	1.9	2.2	+16	168	207	+23

*Notes. All old prices are June, 1980, except for 4341-2 which is December, 1980. All prices are for bare bones CPUs only; they do not include necessary power supplies, cooling units, etc.

Similar bumps were seen for 303X leasing prices between December 1980 and June 1981. A 3033U with 8M bytes saw a 4% cut in December, 1980 followed by a 6% rise in June 1981 and a 13% hike in December of 1981. IBM's sole comment was that it periodically reviews its pricing policy.

Going back to the 1979 timeframe, one area of consistency within families has been maintenance pricing. Since 1979, maintenance prices for 4300 machines have increased between 13% and 42%, whereas those for the 303X series have declined more than 20% over the same period. Hardware pricing for the 303X series has dropped more than 25% over the two-year period.

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• JUSTICE DROPS IBM, PROPOSES AT&T SETTLEMENT in antitrust suits. Sign of the Reagan times. IBM got off scot-free as Justice admitted that its 13-year old antitrust suit was "without merit." Apparently, the increased competition on both the domestic and international fronts was enough to make even Justice realize that it was unlikely to win the suit. Thus ended the six year old trial, which had consumed armies of attorneys and been presided over during the entire time by Judge David Edelstein in a dark, dank courtroom.

The settlement of the AT&T case calls for AT&T to undertake one of the biggest divestitures in corporate history, spinning off its 22 operating companies in return for a new consent decree that gives Justice's OK to enter unregulated businesses -- even DP services, cable, consumer services. The new AT&T will consist of the Long Lines Division (still regulated), Bell Laboratories, and Western Electric. Throughout attempts to break up Bell, AT&T has fought successfully to retain its R&D and manufacturing arms. EDP/IR thinks AT&T is publicly crying crocodile tears about losing the local telcos and privately jumping with glee. But Congress, another party that thinks it has a voice in what AT&T will be allowed to do, has yet to declare its opinion.

• TANDY TO GIVE NOD TO MOTOROLA. It looks like the next generation of Tandy desktops will be built around Motorola's powerful 68000 microprocessor. Tandy is expected to make the announcement on January 19. Such a decision would improve Tandy's ability to address the needs of the business market and large corporate accounts. There are also rumors that Apple will also opt for the 68000. Such moves would give it would the 68000 the boost it needs to catch up with Intel's 8086 success.

• UNIMATION BOSS SAYS ROBOTS COST LESS THAN ONE-THIRD OF LABOR. According to Joseph Engelberger, president of Unimation, Inc., if General Motors had the 14,000 robots it plans to install by 1990 working now, it could expect to save $728 million a year. He also says that the cost of buying and operating a $50,000 robot over a life of eight years comes to only $6 per hour, compared to about $19 per hour for the average auto worker.

• MORE GOOD NEWS FOR CONVERGENT. Coming on the heels of recent large OEM contracts with Burroughs, NCR, Thomson CSF, and Savin, Convergent Technologies has signed an overseas distribution contract with TRW Datacom. TRW has agreed to market both the IWS and AWS workstations outside of the U.S; for TRW the Convergent hardware will help replace the hole in their product line since Datapoint decided to handle its own overseas business. The deal is expected to eventually be worth more than $100 million annually.

• XEROX SELLS MANUFACTURING KNOW-HOW TO MSA. While almost all the big players are trying to get in to the manufacturing market, Xerox has sold its Arista division to MSA. MSA has said that the move will allow them to target the manufacturing software market for IBM 4300 and larger machines. MSA currently specializes in financial and accounting software, although it recenntly bought Peachtree software, microcomputer software specialists. Xerox had acquired Arista in 1977, and says that Arista is profitable but does not fit into to its current product line. Arista specializes in material planning and scheduling software written in Cobol; the company did about $2.5 million in business in 1981.

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EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"The Gray Sheet"

MOLLY UPTON, EDITOR DECEMBER 24, 1981 • VOL.17,NO.17 P.J. MCGOVERN, PUBLISHER

1981 flashbacks -- Page 4

INTEL GETS SET TO ENTER COMPUTER SYSTEMS MARKET; SHOWS FIRST FIRMWARE PRODUCTS

"Users are going to have to adjust to the fact that their cost for software will exceed their cost for hardware until (if ever) significant portions of the program logic development can be automated." -- Kent A. Ochel, President, Intel Systems Corporation

With Japanese competition taking much of the fun out the RAM market, and with new chip technologies continually unfolding, Intel has two good reasons to enter the computer systems business -- fear and opportunity.

Having been a first-hand witness to the cutthroat RAM market (take a look at this year's balance sheet), Intel realizes that the same thing could happen to its microprocessor business. With second sources such as Fujitsu, high profit margins for the 8086 are likely to have a relatively short lifetime.

The RAM market continues to look bleak. The capital requirements necessary for launching a new generation of RAMS have gotten so high that U.S. independent chip makers are thinking twice about entering the race for the 256K chip. If all that lies at the end of the quest is another vicious price war, why enter the market at all?

Intel has always recognized that the value-added component marketplace is the most lucrative, but at the same time it realizes that the memory market has been the key to many technological advances and thus it must steer clear of being merely a niche supplier. As Intel looks toward new mass market opportunities for the eighties, computer systems -- operating systems and CPUs -- seem the most attractive since they play off the company's dual strengths in memory technology and microprocessor design.

Over the last three months, Intel has made several announcements that breathe new life into the long talked about concept of firmware, or hard software. As the 8086 becomes the most popular 16-bit chip, Intel wants to add value to it, creating a hardware/operating system package for system developers that will keep it a full step ahead of its second source competition. Highlights of the announcements are summarized on page two.

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- New operating system firmware. A new two chip set contains a standard 8086 or 8088, coupled with a new operating system firmware component, the 80130. Together the product is called the 86/330 or 88/330. Each provides minicomputer power with the focus on efficient multi-tasking operations.

- A Software Distribution Operation (SDO). Intel's SDO will market software products from independent vendors for the 8086, 8088, and 8080. Initial focus will be on languages and operating systems.

- Establishment a new Microcomputer Systems Division in Oregon. The group includes the 432 micromainframe, the new 86/330 and 88/330, and Intel single board computers and software modules.

The moves reinforce what Intel spokesmen have been saying for some time. That the biggest problems in the industry revolve around software and it is time that silicon technology was used toward the solution. Hard software -- operating system instructions imbedded in the chip -- might also be a big step toward standardization of chip operating systems.

Inside the new 86/330

The 86/330 is designed for multitasking operations. Although Intel is quick to point out that most of the future uses have yet to be invented, when asked it mentions electronic funds transfer (EFT), multi-disk file servers, industrial controls with complicated I/O requirements, computer-aided design, PBX's and multi-user business systems as likely application areas.

In an EFT system for instance, little data processing is involved but the system must handle on-line transfers, security procedures, accounting, and credit authorization procedures. A traditional microprocessor-based system would have to rely on complicated application programs that share the burden of coordinating multiple events in real time.

The 86/330 simplifies matters by combining 35 operating system instructions (or primitives) into a single 80130 chip known as an Operating System Processor (OSP), resulting in a hardware-based operating system kernel specifically designed for multitasking and multiprogramming applications.

Included in the kernel are key multitasking functions such as interrupt handling, message passing, task synchronization, and memory management. Intel says that the kernel can serve as the complete operating system for many relatively simple applications, and can be easily expanded into a custom operating system when required.

The approach taken by the new Operating System Processors is borrowed from mainframe and minicomputer architecture. Instead of each programmer having to put operating system elements in the application program he can simply write the application and use the operating system kernel to coordinate events in real time. The key benefit is expected to be much more rapid application development, since debugged operating system elements already exist.

The OSP configuration includes five new system data types -- jobs, tasks, segments, mailboxes, and regions, all controlled by the 35 primitives embedded in the kernel. The functions are described as follows:

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- The job data type supports multiprogramming. The OSP isolates each application by providing it separate memory, tasks, and other system data types, allowing the programmer to develop applications independent of other applications on the system.

- Tasks are the basic units of execution in real time multitasking systems. The OSP has priority based scheduling, as compared to the first-come-first-served approach in most timesharing systems. The system is interrupt-driven as opposed to polled.

- The segment data type is used for memory management. The OSPs perform dynamic allocation, permitting jobs to share and reallocate memory. The primitives create or delete segments of up to 64K anywhere in the CPU's one megabyte address space.

- The mailbox data type permits communication and synchronization between tasks. OSP primitives create and delete task mailboxes, send segment messages from one mailbox to another, and cause a task to wait at a mailbox to receive a message.

- The region data type prevents one task from seizing control of a shared resource while another task is modifying its contents. This technique is aimed at error-free processing.

Both the 86/30 and the 88/30 are available now, with prices of $165 and $125 respectively, for orders of one hundred pieces. This price is for the two chip set containing both the 80130 and either an 8086 or 8088.

iAPX 432 rundown

Many of the principles of the 86/330 were first unveiled in the 32-bit iAPX 432 micromainframe announced last February. That machine is a three chip set where two chips act as processors -- one for fetching and decoding instructions, one for executions -- while the third chip, the interface processor, handles all I/O, including links to multiprocessing versions.

Operating system instructions are also built into the hardware. Data structures can be transmitted between programs through simple send/receive commands, while all buffering, synchronization and scheduling is performed automatically by the hardware. Its architecture is based on modular programming and data structures, which Intel calls a hardware refinement of the advances in structured programming achieved in the 1970s.

The iAPX is now sold in the form of a board-level evaluation system called the Intellec 432/100 that comes with an RS-232 interface. It is designed to help OEMs learn the 432 architecture and programming methods, and costs $4,250.

And a new 4th generation EPROM

The evolution of ROM chips has gone from read-only memory (ROM) to programable read only (PROM), to erasable (EPROM), and now to electronically erasable (E^2PROM). The first of these was the Intel 2816, introduced in November of 1980; now a new lower cost 2815 has been added. Both are byte erasable, meaning that entire programs or even single line changes can be made without having to remove the chip as was the case with EPROMs. Intel expects

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these new chips to replace current EPROMs by the mid-1980s and thinks they will be especially handy in numerically controlled machines, programmbale controllers, robots, telecommunications, process control, point-of-sale and other areas where frequent reprogramming is necessary.

The battle vs. Motorola

Intel won a major battle when IBM decided to make Intel chips the heart of its Personal Computer (8088), Displaywriter (8086), and Datamaster (8085). Since the software vendors are really just beginning to write software for 16-bit systems, it is likely that a lot of vendors will want to work on the Intel chips in order to target the IBM base.

But Motorola is not exactly folding its hand. Its 16/32 bit 68000 is getting a lot of attention from developers of high end systems that are attracted by its impressive number crunching capability. The 68000 population is moving toward the Unix operating system, especially since Western Electric has drastically reduced Unix license fees. Apollo Computers, Codata Systems, Charles River Data Systems, and Fortune Systems are just a few of the new players, and Motorola has said that several "major, major names" will use the 68000.

1981: RETAILING TO THE MASSES; MAINFRAMERS REGROUP FOR EIGHTIES

Though every year has its ups and downs, 1981 was a particularly well balanced blend of mixed results. High interest rates, declining earnings, and lots of layoffs were countered by flowering opportunities in desktops, software and the office. It was also a great year for public awareness. The one constant is technology that continues to increase price/performance 10% to 30% per year.

For mainframe vendors it was a year of internal reorganization; Burroughs, IBM, and Honeywell have openly recognized the need to build more integrated product families and to find more efficient sales tactics. Vendors are shifting more of their R&D over to software, and everybody is talking about new patterns of distribution and service. Streamlined operations and closer international ties have also been apparent.

But to the outside world, 1981 was the year computer industry came out of the closet. IBM, Hewlett-Packard, Texas Instruments, Sperry Univac, Wang, Xerox, Apple, and even the normally tight fisted Data General hit the airwaves with a blitz of advertising that has more people talking and writing about computers than ever before. Major improvements in the public image of both computers and computer vendors are now recognized as a worthwhile pursuit -- IBM's tactic seems an attempt to smother Big Brother with downy cuteness.

Increases in newspaper, radio, and magazine ads, coupled with the nationwide spread of retail computer stores confirm the new push to bring computing to the masses. There is even a weekly TV show, Computerworld, and books from Alvin Toffler's philosophical Third Wave to Tracy Kidder's descriptive Soul of a New Machine penetrate the best seller charts in numbers rarely had by the American industrial community.

Then there is Ma Bell which has almost totally reworked its ad campaign toward all sorts of business oriented ads with blatant pitches for computer services. "The knowledge business," "telemarketing," and other ads show rooms full of terminals, not just phones, and as the Advanced Communications Service

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(ACS) and its progeny start to roll off the drawing boards, Bell should find a well-seeded marketplace.

Mainframer's events of note in 1981

Other than IBM, the mainframers had a relatively quiet year. Members of the BUNCH (Burroughs, Univac, NCR, CDC, Honeywell) seemed almost headline shy and came forward with precious few major product moves. The industry is slowly learning to talk to itself; all the mainframers now support the X.25 recommended communications standard and Burroughs and Honeywell offer SNA support. A second half recession and a strong dollar abroad sapped earnings, and Wall Street folks began to openly question the prospects for several of the industry's giants. Brief recaps for the mainframers are provided below.

IBM:

Corporate. Major reorganization designed to unify sales force and product development groups; divides world into large and small customers.

Desktops. Enters personal computer business with 16-bit system that sets the price/performance standards, solicits software from the public.

Software. Decides to cooperate with third party software groups, expands installed user programs. Shows SQL, a high level database package.

Mainframes. Unveils new 3081K that comes much closer to matching the price/performance of the 4300s than the 3081D. Adds mid-range 4300s.

Operating systems. New MVS/XA moves IBM into 31-bit addressing from previous 24-bit limitations. Adds simplified SSX operating system, a preconfigured subset of DOS/VSE for 4321 and 4331 machines.

Storage. Finally begins delivery of 3380 disks, but drops fixed heads in the process, increasingly relying on 3880 controller functions.

Distribution. Adds to OEM business via 680 Winchester used in the 8100, S/38, S/1, S/34/ and 5520. Allows independent distributors to sell 3101s and model 51 printers. Selling desktops through Computerland.

Lawsuits. Government antitrust slowly running out of gas. Agrees to support Installed Productivity Options to avoid suit by NAS in Europe.

Financial. Gets serious about volume pricing on Series 1, 8100, and 4300. Cooperates with Citibank in leasing program. Offers purchase only 4321, as part of general push away from leasing. Buying of tax credits proves still cash rich. Says years of heavy capital expenditures are over and anticipates return to 20% profit margins. Stock price remains flat; earnings down a bit.

Honeywell also reorganizes to integrate development for large and small systems. Makes big advertising splash with campaign for office automation; introduces DPS/6 based Infowriter. Importing Current Mode Logic from CII-HIS Bull for DPS 7. Making efforts to improve manufacturing software.

Burroughs CEO Blumenthal's first full year in command saw major reorganization in July. Hit with some 160 suits by customers of B 800 and 900 machines.

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Acquired both Memorex and Systems Research Inc. Made moves toward office by getting workstations from Convergent Technologies and making concerted efforts to combine its office pieces, incorporating OCR machines into OFIS 1 system. Drops plans to develop supercomputer as part of cost-cutting plans. Financial stability still questioned; posted first losses in 20 years.

NCR continued to quietly fight its battles on the point-of-sale and banking arenas, especially internationally. Entering the office via gear bought from Convergent Technologies; plans to add its own products later. Entered semi-custom chip fabrication market. First 32-bit processor, the 9050. Suing AT&T over technology licensing policies. Hurt badly by dollar's strength overseas.

CDC profited from its aggressive OEM peripherals business and chalked up the year's highest mainframer earnings gains (11%). Announced 3380-type disk and 3880-type controller. Re-entered supercomputer business. Came out with new desktop, and opened business centers run by Service Bureau Company.

Univac shows new multiprocessor versions of 1100 series. Says it is finding new customers via strong orders for System 80 which was also expanded from 1MB to 4MB. New, more compact models of 16-bit V77; still has plans for 32-bit system. Experimenting with selling preconfigured systems. Opened Manufacturing Resource Center to act as consultants to manufacturing clients. High level applications language, Mapper, is being well received.

Rest of the world round-up

- 1981 was another good year for software with just about everyone in the mini and mainframe market encouraging the efforts of independent software vendors, and software publishers proliferating in the desktop market.

- Hot action in the satellite market. SBS, Tymnet and seven others enter Digital Termination Systems (DTS) market hopening to capture local loop market Lots of plans for new birds; success of space shuttle bodes well.

- Japanese chip makers grab some two-thirds of the independent 64K chip market. Get head start on race to 256K. U.S. independent chip makers have worst year since 1975-76.

- Though only Datapoint seems to be installing them, local networks emerge as a new theme. Broadband vs. baseband still unresolved. IEEE standards may not mirror Ethernet which has precious few installations.

- Japanese large systems still on hold. TRW-Fujitsu came out with System 34 competitor, while a score of desktops have yet to find significant distribution channels. Sony enters office market, but with little impact thus far. Japanese success limited mostly to peripherals, chips, copiers, and communications equipment. Becomes recognized leader in both robotics and automated factories.

- Miscellaneous. DEC becomes second biggest computer company. CP/M operating system rockets to center stage of desktop market. Baby Bell will walk before Congress decides what it can and can't do. CAD/CAM market seen as savior of Fortune 500 manufacturing. Exxon runs aground. Notable startups include Plexus, Formation, Charles River Data Systems, Fortune systems, Stratus, and Spartacus.

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1980 REVENUE PER EMPLOYEE, MAJOR U.S. CORPORATIONS*
($ in thousands)

Computers	Computers	Manufacturing	Electronics	Aerospace	Consumer	Oil
IBM-76	DEC-43	U.S. Steel-83	RCA-60	McDonnell/	Procter &	Exxon-548
NCR-48	DG-46	Ford-87	Raytheon-64	Douglas-74	Gamble-176	Mobil-279
Burroughs-49	HP-54	Celanese-104	Gen. Elec.-62	Lockheed-72	Borden-120	Texaco-767
Honeywell-56	Univac-49	Goodyear-58	W. Electric-67	Martin/	Gen. Mills-63	Gulf-456
CDC-56	Wang-48	Whirlpool-97	Westinghouse-58	Marietta-77	Anh. Busch-183	Shell-550
Average-	52.5	85.8	62.2	74.3	135.5	520

*Revenue and employee data taken from Fortune 500 listings, as printed 5/4/81.

Computer industry vs. the rest of the business world

It has been said that it is only a matter of time (15-50 years?) before the computer industry is the largest in the world and IBM becomes the king of all companies. After all if Exxon and General Motors rose to the top during the automobile era, shouldn't IBM and AT&T take command during the information age?

Such preeminence will, however, be some time in coming. Disbelievers could point out that IBM has actually dropped in the Fortune rankings from 5th in 1969 to 8th in 1980. Even taken together, the computer/communications industry is only a little more than $100 billion, and International Data Corp. projects that the figure will be just $200 billion by 1985. In comparison, the revenues of the 13 largest oil companies in 1980 totaled well over $400 billion.

But if yardsticks other than revenues are used, the gap can be considerably narrowed. For instance, the explosive rise of the oil industry (13 out of the nations 20 largest firms compared to 7 in 1969) is primarily a price phenomena. Wholesale prices have risen some 800% since the 1973 embargo. Actual production has gone up relatively little in that time. In contrast the information processing industry continues to deflate its prices, and thus the enormous increases in processing power installed are not shown by revenues alone.

Additionally, in terms of number of workers employed, the oil industry is not the behemoth some might think. IBM with about 25% of the revenues of Exxon employs twice as many people. And in general the oil companies take in about four to fifteen times the revenue per employee as firms in the DP industry, as shown in the industry comparison chart above.

As that chart shows clearly, only IBM has a ratio that compares with those found in other major industries. The average for the Fortune 50 is $133,000/employee, but this figure is distorted by the presence of 19 oil companies; if the oil companies are not counted the figure drops to $81,000.

Due to differing capital and sales requirements the ratios should be expected to differ among different industries, but the numbers above do suggest that either competition in the information processing industry is especially intense, or the industry is not using its personnel very efficiently; maybe both. Perhaps the most logical comparison is to the electronics industry which has a similar design/manufacture structure.

But regardless of the reasons, ratios in the 40s and 50s put a real limit on potential profits, and thus it is no wonder that vendors are scrambling to up the productivity of their sales, service, and manufacturing operations.

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• MCI BUYS XEROX'S INTERNATIONAL LINK. MCI Communications has purchased WUI, a Xerox subsidiary consisting of Western Union International (an international records carrier), Air Signal International (which offers radio paging in the U.S.), and WUI/TAS (a telephone answering service operating in 47 cities). For MCI the move is the first step toward its stated intention of getting into the international phone service business, presently served only by AT&T. For Xerox, the move marks the total exit from the telecommunications market. Once the Xten network was scrapped the company apparently saw little reason to hold on to WUI. All that remains of Xerox's grand scheme is the Ethernet local network. MCI says that the $185 million purchase price will be paid in cash; MCI's 1981 revenue will be approximately $250 million.

Xerox has just published specs defining high level Ethernet protocols, corresponding to levels three through six of the International Standards Organization model. They are available free of charge.

• MULTIPROCESSING FOR DECSYSTEM 10. A Symmetric Multiprocessing (SMP) capability allows three CPUs to share the same memory and a single Tops-10 operating system. In addition to improved performance, the SMP offers fault tolerant computing, since in the event of failure the SMP can dynamically allocate the working processors. Dual CPUs were introduced earlier this year and prices for an upgrade from a dual to a triadic configuration start at $440,000. First shipments are scheduled for January.

DEC also has made its RP07 498 MB Winchester available for Decsystem 10 and 20 machines, marking the first time it has used Winchester technology for one of its mainframe systems. The data transfer speed is 2.2MB/sec and up to eight drives can be linked through a single controller. The RP07 costs $38,000 and will be available in May. DEC is also closing 13 of its 28 plants for the four days between Christmas and New Years, its first shutdown ever.

• COMPUTERS HELP BALANCE OF PAYMENTS; FUJITSU BLASTS AT&T PROCUREMENT. According to the Computer and Business Equipment Manufacturers Association (CBEMA), computer exports for the first nine months of 1981 totalled $7.9 billion, while imports were $2.6 billion, resulting in a surplus of $5.3 billion, up some 19% over the same period last year. CBEMA projects this year's total DP surplus will be $7 billion. On the dark side, Fujitsu is objecting loudly to AT&T's decision to give a fiber optic contract to Western Electric. Fujitsu has called the "national interest" arguments a "red herring" used to obscure the real issue which is protectionism; it added that the move could have major repercussions for U.S. firms eyeing Japanese market.

• IBM SET TO ENTER ROBOTICS MARKET. With manless factories popping up all over Japan, U.S. firms are hustling to play catch up. IBM is expected to enter the market early in 1982 with a machine for either high-speed assembly or component insertion. IBM has been using Unimation robots in-house for several years and is doing its design work at its Boca Raton, FLA facility. Both IBM and General Motors have reserved space at the upcoming Robots VI exhibition to be held in Detroit. On a sad note, the Japanese government has verified that a worker was accidentally killed by a robot last July. Apparently, the man was working in an unauthorized area and didn't see the approaching transport robot; the accident is the first recorded fatality involving a robot.

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Supermini outlook -- Page 5

MINI VENDORS CHASE OFFICE GOLD, VENDORS SAY MARKET COULD EQUAL DP BY END OF DECADE

If the giants of the DP industry are correct, the use of office computers could equal the DP side of the business as early as the end of this decade, adding a second powerful booster to the information industry's steady rise through the ranks of world industry.

No one doubts the potential -- the number of offices, the number of white collar workers, the hoards of information handlers, etc. The territory looks so fertile that mainframe, mini, and word processing interests are stepping all over each other as they try to stake their claims. Among the major DP firms, only Control Data and Univac have avoided the rush, even though much of the automated office is still talk and promises.

Given the backgrounds of the contestants, it is not surprising that vendors are hitting the market from all sides. Wang leads a bunch of bottom up WP strategists; IBM heads the top down mainframe-based list, while the mini vendors want to put themselves in the middle and compete on both ends.

Since EDP/IR believes that, for vendors and users, the key question is what hardware will sit immediately below the mainframe and who will provide it, the mini vendors appear to have an inside post, but their lack of experience in software and in developing office systems presents an obvious handicap. Other key competitive criteria;

- Data base software. Users want powerful, easy to use data base software for information retrieval, report generation, graphics, etc. Relational data bases and high-level languages will be a key.

- Communications. Electronic mail and document distribution will become commonplace in Fortune 500 size organizations. Reliability and security are two main concerns.

- Compatibility. Existing incompatible DP software is only compounded by the problems of diverse text codes. The compatibility vs. vendor lock-in dilemma continues unanswerable.

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In using intermediate CPUs to off-load office tasks from IBM hosts, users must decide whether to use a cluster/controller 8100 that can be closely coupled (high level communications), or opt for a loosely coupled (ISO level 2 type links) non-IBM machine that may provide a more effective local solution.

Since functions like electronic mail and report generators will seemingly require homogenous hardware and software, only strong top management leadership can prevent the spread of rising towers of distributed babble. A recent International Data Corp. survey showed that 88% of the Fortune 500 believe that the standardization of office equipment is either a current or expected problem. (If it is true that commercial users often follow the experience of the military, the eighties will see a near total disaster in the proliferation of incompatible equipment held together by increasingly expensive bandaids.)

The need to standardize equipment seems to play into the hands of the major DP vendors since few Fortune 500 size companies will be willing to build their office networks around any vendor that either appears to be less than blue chip or does not have the resources to build a full-fledged integrated office. A high IBM official recently told EDP/IR that when IBM looks at the competition in the office arena, it is much more worried about DEC and the BUNCH (Burroughs, Univac, NCR, CDC, Honeywell) than it is about any word processing company, Wang included.

Office automation vs. word processing

Cynics, looking at Wang's spectacular growth, might say that as usual IBM has its head in the sand, but the perspective reinforces the view that, ultimately, word processing is only a small part of office automation. It also recognizes that in the future DEC and DG will, as Prime has already realized, have to compete directly with IBM if they are to maintain the growth to which they have become accustomed.

Although office automation cut its teeth on word processing, and good WP is still essential to selling office automation systems, EDP/IR believes that shared data bases and communications will emerge as the heart of any large scale integrated office system. Leading applications currently available are easy-to-use report generators, graphics packages, remote data base access and manipulation, electronic and voice mail, and video teleconferencing.

Perhaps because of this, the office market is steadily being segmented into those who plan to offer an integrated data/text/communications system, and those that plan to concentrate primarily on the word processing side of the business, the latter group include firms such as Lanier, Exxon, Philips, CPT, and NBI. Only Wang seems to have a real chance to graduate from word processing specialist to office automation vendor.

Small primarily WP companies lack the resources necessary to develop both the hardware and software needed for large data base management systems. Wang, which is a minimaker, found this out when it pulled its ADMS DMBS off the market and replaced it with Cincom's Total for its VS systems. Learning WP is more a matter of knowing the market and paying attention to detail than it is a technological challenge. But don't feel too sorry for the little guys; the WP firms will continue to do well by providing highly efficient WP systems; they have developed 2780/3780 batch communications and the push is on to 3270-type protocols; NBI has said that it will go all the way with SNA.

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Office automation ... who's doing it?

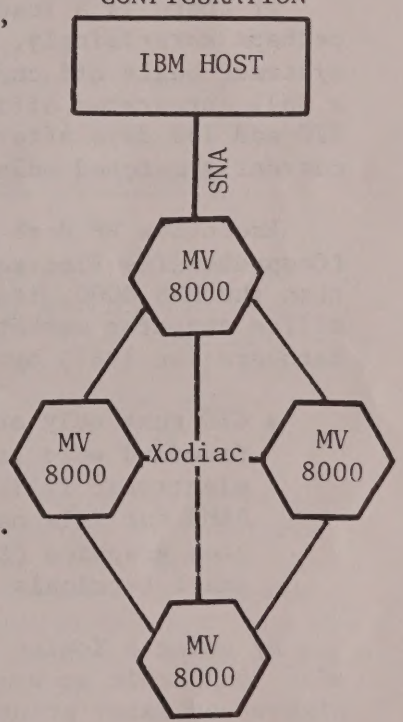
The use of sophisticated office features is still far from extensive. An IDC survey of 1,700 members of the International Information and Word Processing Association (IWP) showed that only 7.5% had any kind of electronic mail and only 9.2% had a non-Bell system for local communication. (And since IWP member firms tend to be among the more active users, the sample is skewed toward exaggerating actual use.) Yet despite the low penetration, EDP/IR has detected a high degree of satisfaction among many electronic mail and teleconferencing users, and expects the use of both these services to catch on quickly with large business/government organizations. Typical is Hewlett-Packard which is moving much of its sales force training over to teleconferencing.

Rekindle the old magic

After watching the heady growth of the seventies taper off, mini vendors see the office as a chance for a second trip to boomtown and a major new market for superminis. In their recent announcements, Digital Equipment, Data General, and Hewlett-Packard all payed deep homage to the vital importance of the office to their respective company's future, an urgency increased by the relatively flat expectations for the traditional mini market through 1985.

Vendors like Wang, Datapoint and Four Phase have had success in selling office/DP systems, steadily upping system power. Four Phase, recently acquired by Motorola, is using 4300-compatible machines from Two Pi, and Datapoint last year came up with its first 16-bit processor. Ironically, even Wang has not done a good job of integrating its office gear with its mini business. Datapoint with its PBX and Wang with its voice mail have also staked claims in the integrated voice/data field.

POSSIBLE SNA/DG CONFIGURATION



For the minimakers, the office is also crucial because of its implications for the DP side of the market. Whatever hardware sits below the mainframe will be the one that controls the electronic mail system, giving that vendor the edge not only in terminals but in future network nodes. For IBM, the supermini threat is perhaps best shown in the DG scheme opposite. If the multiple data base problem can be overcome, networks of superminis could render the host a lonely numbercruncher.

Hardware round-up

Over the last two months, U.S. mini vendors have served up an almost indigestible amount of product offerings. Among the common themes are electronic mail, graphics, report generators, and improved WP software. Missing are any attempts to follow IBM and Wang into the voice messaging business. A rundown of the DEC, HP, and DG announcements begins below.

Hewlett-Packard says that it is now spending more than 50% of its R&D money on software development and that because it spends 10% of its gross receipts on R&D it will be able to give full attention to both the office market and its existing commitment to manufacturing and scientific users.

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Office automation products accounted for only about a quarter of the deluge of announcements from Hewlett-Packard on October 31. HP's move toward the "interactive office" is concentrating on four areas: document management, decision support, personal support, and organizational communications, all supported by a central 3000. Its strength in both graphics and communication with IBM will help, as will its installed base of more than 8,000 series 3000 machines. Highlights include:

- New WP software based on intelligent terminals; up to 1 million pages on-line text storage; and new relational software under the Rapid/3000 label including custom report generators (Inform/3000), a relational Dictionary (Dictionary/3000) and other data base and programming aids. Other important, but previously announced parts of the HP puzzle include the 125 personal computer, decision support graphics, and the 2680 laser printer. Planned for 1982 are electronic mail and electronic filing.

Outside the office, a 1 MIP series 3000, new disk drives, SNA support, and new programming tools were also included. The range of the 3000 series now runs from the new 256K Series 40 ($45,559) to the 2-8 MB Series 64 ($221,920) with 8K cache, 32-bit data bus and 32-bit arithmetic, but still compatible with all 3000 series software. The 7935 disk drive ($27,500) provides 404 MB at less than half the cost of previous HP products. SNA support comes through 3270 emulation via SDLC.

If there is a leader in this round of the competition, it is probably, and perhaps surprisingly, Data General. DG is placing its bets on decision support systems, built off compatible DP and office gear. More than DEC or HP, DG has a full integrated office/DP system ready to ship with orders filled between 120 and 180 days after receipt of order; and the scope of its system is currently matched only by Prime's.

Executive VP Herb Richman pronounced the new system -- cleverly called CEO (Comprehensive Electronic Office) -- more important to DG and the industry than the MVS 8000, its first 32-bit system. And DG has also said that the office computer market will equal today's minicomputer market ($6 billion in hardware for 1981) by 1985. Among the pieces announced:

- CEO runs only on Eclipse series machines under AOS or AOS/VS. Standard word processing ($6,000). Multi-node electronic mail and electronic filing with key word search ($15,000). Relational like DBMS for file manipulation and decision support ($11,000). Trend view graphics ($3,000) creates charts from tabular data. Some new smart terminals and a token passing local network.

By using a Xodiac network bus, up to 32 CEO and DP systems can be on a mile long cable at speeds up to 2 Mbit/sec. With such a system an intelligent high-speed laser printer would be nice.

DEC has already managed to place itself within 350 of the Fortune 500 companies and thus it sees itself as well positioned for additional sales to its existing customer base. Like IBM, DEC has had problems with both product line clarity and compatibility. President Ken Olsen called the move into the office "One of the most significant announcements the company has ever made." DEC already has more computers installed that any other vendor and a strong position in the office will be essential to maintaining this edge.

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Though in the past DEC has failed to coordinate its office potential, EDP/IR feels that DEC will try to move quickly in the office market since this is an area where it can grow and add software without stepping on the toes of its OEM customers. DEC has stated that it will combine office, DP and communication functions, while requiring the end user to understand one basic set of commands. The company has a range of office products that is more complicated than other mini vendors, and it prefers to break them down as follows:

Personal	Departmental	Corporate
Decmate (DP/WP)	PDP 11/40, 44, 70	VAX 750, 780
WS 78 (WP)	Datasystem 700 (VAX 750)	Decset (typeset)
VT100W (WP)	Decword 11/34 (WP)	Decsystem 10, 20
VT 125 (graphics)	Decword/DP 11/34 (DP/WP)	Decnet

Over the last year, DEC has been steadily announcing parts of its so-called Office Plus system for the last year. Since September it has revealed:

- DECmail ($12,000) is a polished version of DEC's in-house system that currently runs only under a single node VAX 11/750, or /780, and can be used by any DEC terminal.
- VAX Information Architecture includes DBMS, data retrieval software and dictionary for VAX CPUs.
- DECset converts WP output from DEC and non-DEC systems to formats for typesetting systems.

SUPERMINIS TAKE CONTROL OF MINIMARKET; SHIPMENT VALUE MORE THAN DOUBLES TRADITIONAL MINI SALES

The world of the minicomputer vendors has changed dramatically over the last few years. The traditional minicomputer has matured, leaving the fast growing microminis and superminis to vie for center stage. Given that many experts expect that over the next five years the power of today's minicomputers will be contained in the terminal itself, it is not surprising that mini vendors are focusing on both desktops and superminis for future growth.

Though 32-bit systems are catching on, the majority of supermini unit sales will continue to be 16-bit machines through 1985 largely because of the large user and OEM investment in 16-bit operations and software. There is also the possibility that many users simply do not need the power inherent in today's 32-bit machines, and given the considerable price differential between many 16- and 32-bit CPUs, some users will be content for the less glamorous alternative. 32-bit supermini revenues should pass those for 16-bit in 1984.

End-user sales are particularly important in the supermini arena, and minicomputer vendors continue to beef up their in-house software capabilities. Despite the fact that the ratio of end user/OEM sales has remained relatively constant since 1975, IDC feels that after 1982 the scales will tip steadily toward the end user part of the business, especially in terms of revenue, as opposed to unit shipments. Average system revenue for end user sales is increasing rapidly while the average OEM sale has remained relatively flat over time. The average end user sales is some three times that for OEMS.

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WORLDWIDE SHIPMENTS OF U.S. VENDORS, 16-BIT SUPERMINIS
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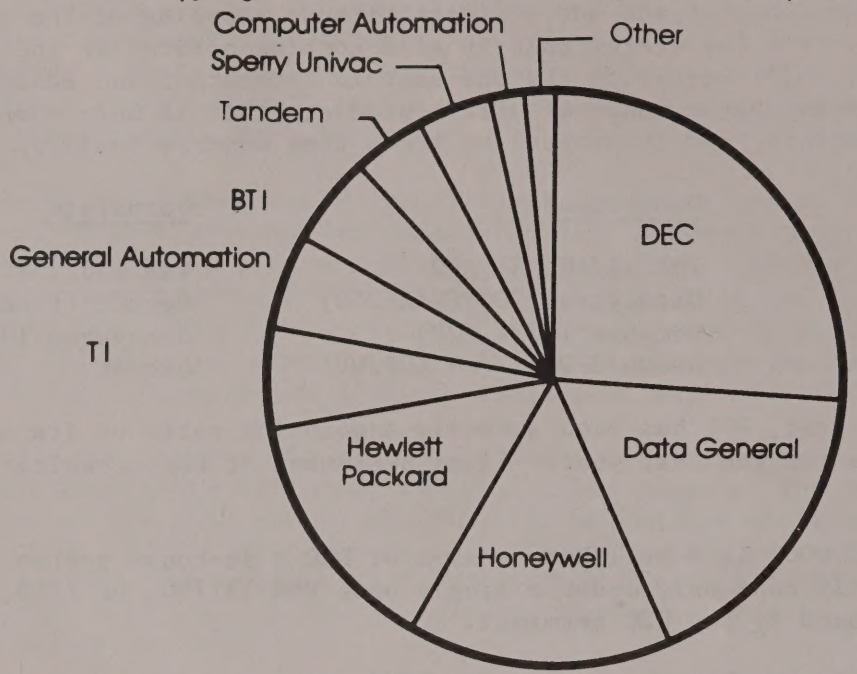
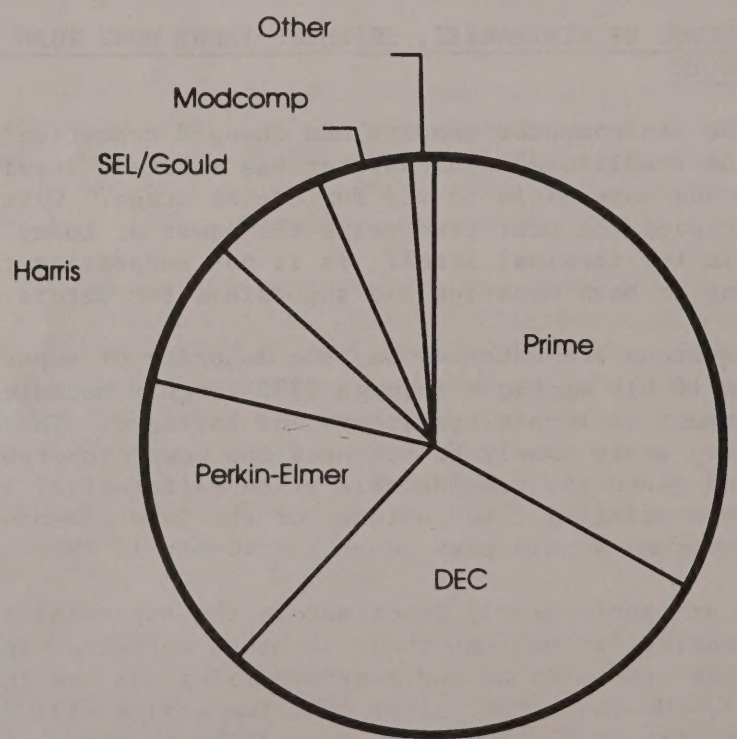


Total Units Shipped 1980 — 17,912

WORLDWIDE SHIPMENTS OF U.S. VENDORS 32-BIT SUPERMINIS
(Copyright 1981 -- International Data Corporation)



Total Units Shipped 1980 — 6,005

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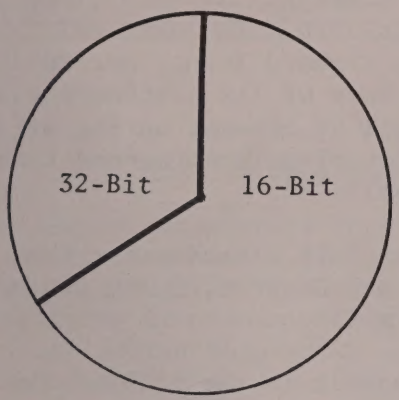
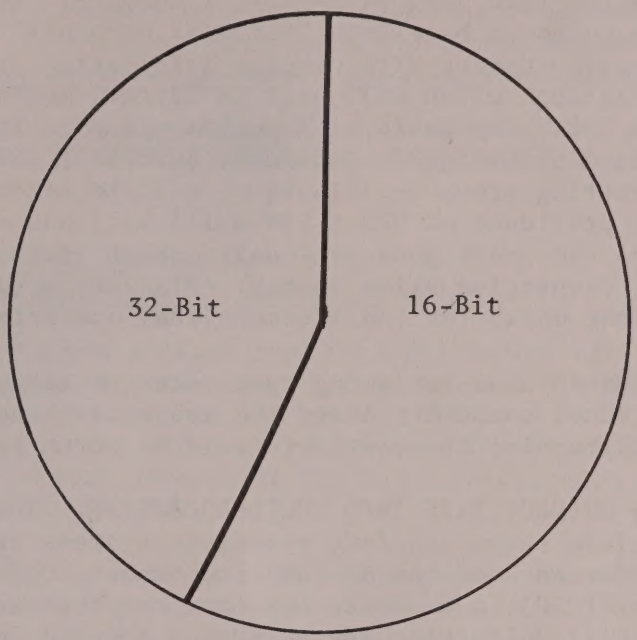
WORLDWIDE SUPERMINI SHIPMENTS BY U.S. MANUFACTURERS, 1981-1985
(Copyright 1981 -- International Data Corporation)

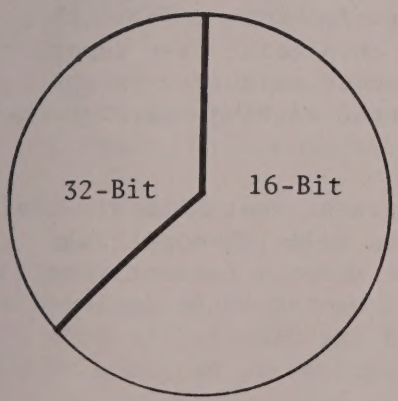


Total- 23,900

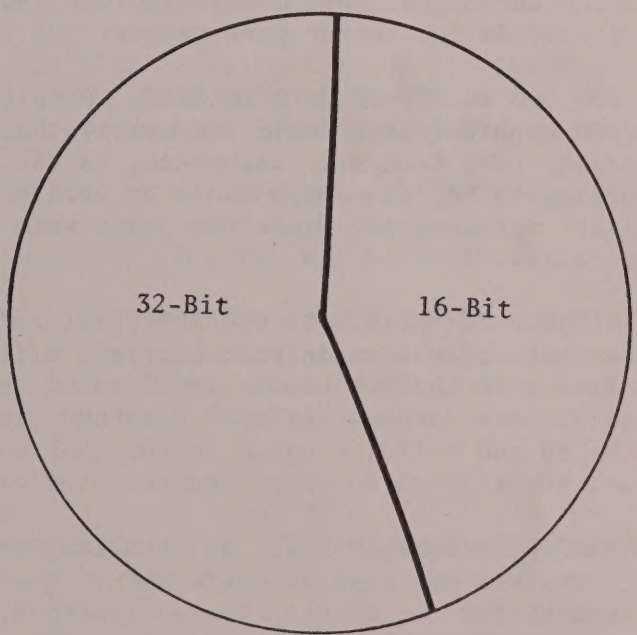


Total- 60,200

VALUE OF WORLDWIDE SUPERMINI SHIPMENTS, U.S. MANUFACTURERS, 1981-1985



Total- $3.5 Billion



Total- $8.8 Billion

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• IBM TIPS HAND ON MARKETING CHANGES. It's official now. IBM will divide its customer base into "National accounts" which handle sales to "selected large customers with complex information processing needs," and "National marketing" which will sell to "large, medium and small customers throughout the U.S. The National Accounts group -- based in White Plains -- will be headed by George H. Conrades, currently President of DPD. The National Marketing group -- Atlanta -- will be headed by J. Richard Young, currently the president of OPD. IBM still will not say how many of its customers will earn the prestigous national account title; nor will it comment on the size of the respective sales forces. Similar reorganization plans are rumored to be in the works for the international operations as well.

IBM is also reviewing candidates to second source 5.25 floppies for the personal computer; among the suspected candidates are Shugart, Qume, and Micro Peripherals; the contract could be worth some $75 million.

• UNIVAC LEAPS INTO MULTIPROCESSING. Four new models in the 1100/60 family include three and four processor systems that offer up to twice the performance of the H2 dual processor. Univac also introduced a main storage unit (MSU), a separate box that can increase maximum memory up to 32 MB. initial deliveries are scheduled for the fourth quarter 1982.

• MAGNUSON ACQUIRED BY STC. Storage Technology is finally in the general purpose computer business. To no one's surprise Magnuson ran into the arms of its number 1 customer when the red ink started to get deep. Best estimates are that the price was a relatively cheap $67 million. Magnuson also improved the price performance of its M80 line about 16% in response to IBM's recent 4300 announcements. New models include the M80/30E and M80/41, equipped with new microcode for better performance.

• $50,000 BOUNTY ON CHIP THIEVES. Despite heavy security precautions, some 500,000 sophisticated logic and memory chips were stolen form a Monolithic Memories' (MM) Sunnyvale warehouse, in the largest chip heist ever reported. According to MM, the chips could be used for just about anything, except military applications since the chips were only tested withing narrow temperature ranges.

• HITACHI TO ENTER U.S. CPU BUSINESS? Rumors persist that Hitachi, the number two Japanese mainframe company, will begin to sell IBM-compatible mainframes in the U.S. under the Hitachi name. The company currently sells large systems through National Advanced Systems. Expected to be included are the M-160 and M-170, roughly in the 4341 range, and the 240H in the 3081 class; how this will affect its relation with NAS remains to be seen.

• HONEYWELL REORGANIZES. As with IBM, integrating development of large and small systems was a major motivation. The Systems Group will provide common management for the Phoenix (large systems), Billerica, MA (small systems) and a new Networking Management Division. The move becomes effective 1/1/82.

• CORRECTION. Vol. 17, No. 15, page 3. The machine cycle times for the 4331 series are 100 nanoseconds for 4 bytes. The 4341 times are for 8 bytes. The 900 figure listed refers to the memory read cycle.

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EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"The Gray Sheet"

MOLLY UPTON, EDITOR DECEMBER 4, 1981, ● VOL.17,NO.15, P.J. MCGOVERN,PUBLISHER

IBM RESHUFFLES 4300 LINE; ADDS NEW OPERATING SYSTEM DESIGNED FOR SIMPLE OPERATION

After almost three years on the market, IBM's plans for the 4300 series are less clear than ever. The glamor system that set the price/performance standards for the early eighties can no longer rest on its reputation as a small central site processor. Increasingly, it is being asked to help defend against both interactive superminis and distributed processing hardware, roles once entrusted solely to the 8100 information system.

IDC's latest study of the migration patterns of IBM users shows, not surprisingly, that 4300s are steadily replacing central site 370/138, /148, /158 machines. Of those switching, a significant 6% chose a non-IBM/PCM CPU, up from 2% in the January 1981 survey. The PCM's share rose to 2%.

Major changes in the 4300 line, coupled with the October 20 announcement of remote control facilities, have now re-addressed both the DDP and scientific markets. They have also created 4300 product line confusion, while casting long shadows over IBM's commitment to the 8100. Highlights include:

- New hardware. Four new models will be available in March, filling the gaps between the 4331 and the 4341-2, including a preconfigured 4331-1 called the 4321. Field upgradability is stressed throughout. Memory on the 4341-2 can now be doubled to 16MB.

- A new operating system. The SSX/VSE is a subset of DOS/VSE that comes in fixed configurations and is designed to be programmer friendly with prompts and productivity aids the big buzzwords.

- New CAD/CAM software. IBM is suddenly putting a lot of emphasis on the 4300's strength in scientific environments. Apparently taking aim at Prime and DEC, IBM has come out with three new CAD/CAM packages through its Installed User Program (IUP).

- Price cuts. Existing 4300 model prices have been cut from 11% to 17%, leaving prices lower than before the June 1981 price increases. Recent 4300 buyers have good reason to gripe. Users, willing to buy more than five machines, will be more pleased with the 4300 and 8100 families' new volume purchase plan.

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IBM 4300 OPERATING SYSTEMS
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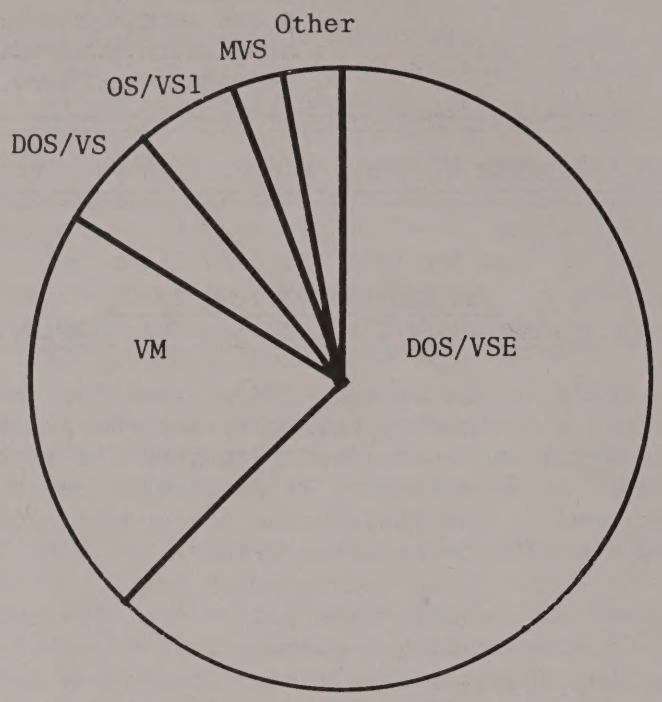
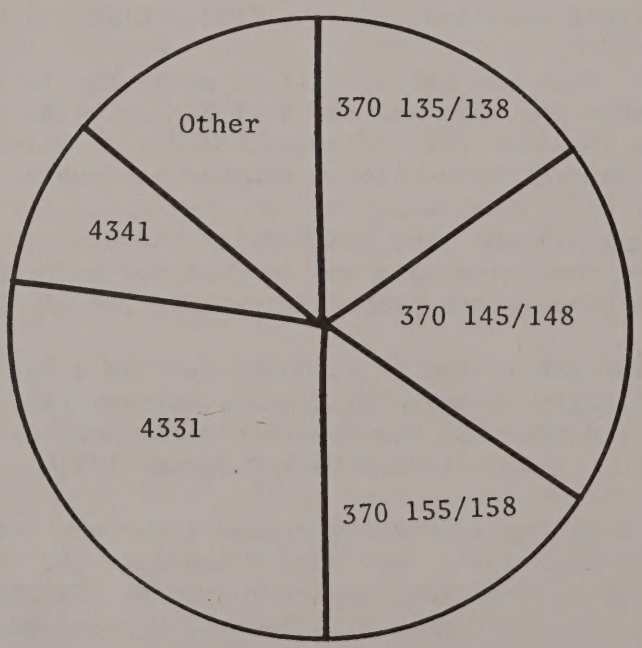


MACHINES REPLACED BY IBM 4300s
(Universe 193 CPUs)



The segments in the pie sum to the total of 193 IBM 4300 machines installed as replacements for installed IBM machines.

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FEATURE COMPARISON, IBM 4300 FAMILY
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	4321	4331-1	4331-11	4331-2	4341-10	4341-1	4341-11	4341-2
IDC Perf. Rating	11	11	16-20	22	34-38	40	50	66
Memory	1MB	.5-1MB	1-2MB	1-4MB	2-4MB	2-4MB	2-8MB	2-16MB
Buffer size	0	0	4K	8K	4K	8K	8K	16K
Machine Cycle time	900	900	900	900	150	150	120	120
# Channels	0	1-2	2	1-3	3-6	3-6	6	6
Upgrade to	4331-11	4331-2	4331-2	--	4341-11	4341-11	4341-2	--
CPU price (MB)	85,000 (1MB)	79,500 (1MB)	109,650 (1MB)	140,700 (2MB)	178,000 (2MB)	256,000 (4MB)	306,400 (4MB)	516,000 (12MB)
DASD Supported	3310 3370	3310 3340 3370	3310 3340 3370	3310 3330 3340 3350 3370	3330 3340 3350 3370 3380	3330 3340 3350 3370 3380	3330 3340 3350 3370 3380	3330 3340 3350 3370 3380
Operating Systems	SSX/VSE VM	SSX/VSE DOS/VSE OS/VS1 VM	SSX/VSE DOS/VSE VM	SSX/VSE DOS/VSE OS/VS1 VM	DOS/VSE OS/VS1 VM MVS	DOS/VSE OS/VS1 VM MVS	DOS/VSE OS/VS1 VM MVS	DOS/VSE OS/VS1 VM MVS

SSX, you get it their way

IBM describes its SSX/VSE (Small Systems Executive/Virtual Storage Extended operating system as more of a packaging philosophy than a technological innovation. It is a stripped down, non-configurable version of DOS/VSE, with some new wrinkles designed for programming ease of use. IBM stresses that SSX is not a replacement for DOS/VSE and it would not recommended SSX for all DOS/VSE 4331 shops, especially those that expect to eventually reconfigure their system. All programs written in SSX will run under DOS/VSE, except for those utilizing unique SSX features.

SSX will only run on the new 4321 and all 4331 models with at least one megabyte and under fixed block architecture -- meaning 3370, and 3310 disks. 3350 and 3380 disks use count key formats (the 3380s also need at least a 4341-size machine and the 3350s need at least a 4331-2). Consequently, SSX support is not likely to extend beyond the 4331-2.

Pregeneration of a fixed subset of DOS/VSE components is said to enable two-hour SSX installation, since all operating system components can be loaded by a single tape. IBM has compared the effort needed for SSX installation to

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that of putting up a new DOS/VSE release. The fixed configuration should also improve system stability, making scheduled preventive maintenance unnecessary.

SSX also reflects a new IBM philosophy toward the small user. It is available for a one time license fee of $20,000, a first for IBM. (SSX can also be licensed for $1,000/month.) The outright purchase policy seems to parallel the purchase-only 4321 hardware. The emphasis is on a standard product, easily installed, with little need for either systems programmers or frequent contact with IBM representatives. In other words, less emphasis on recurring revenues, more on mass production.

Included in the pregenerated package are DOS/VSE SCP Release 3; CICS, ACF/- VTAM, VSE/VSAM, RPG II, DL/1, COBOL, PL/1, and more. COBOL is listed as the main programming language, and as yet there has been no mention of any higher level query languages such as the end-user-oriented SQL relational DBMS which runs under DL/1 DOS/VSE. As the system stands, the prompts and productivity aids are aimed at programmers, not end users, and thus IBM cannot really claim that this is a "user friendly" system.

Even IBM recognizes that large DP departments slugging it out in COBOL are never going to catch up with their application backlog. The giant's latest buzzword in its "How to improve programmer productivity" vocabulary is the information center. Information centers are staffed by programmers and systems analysts, but they work outside of the DP department acting as consultants to help end users satisfy their own needs -- recommending hardware and languages, giving technical advice, etc. Relational databases running on user controlled hardware is a key part of the concept.

SQL is the first fruit of IBM's long term System R project; it is billed as an easy-to-install, easy-to-use application development tool that can offer more than a 100% improvement in development productivity in many environments. EDP/IR believes that it will be a key part of IBM's end-user strategy. If SSX is really geared for end user sales, it will probably eventually include SQL, making the 4300s a much more viable DDP machine.

SSX already provides all the essential hooks for SQL -- 1-2 MB memory, DOS/VSE Release 3, and VSE/VSAM; it can also run independently of DL/1. When asked, IBM said simply that SQL is not now supported. In time, SQL will be on MVS and VM as well, but the timing is unclear due to the recent major reshuffling of the MVS architecture and its subsequent relation to both IMS and DL/1.

Unlike other operating systems, IBM does not anticipate a steady stream of new SSX releases, and an IBM spokesman said that IBM does not have any new releases planned. A low $90/month maintenance charge reflects IBM's confidence in the product. IBM says that over two years SSX will prove to be 40% less expensive than DOS/VSE. All SSX documentation is "task oriented," meaning it shouldn't be necessary to access more than one volume for any one problem.

Most of SSX will be available in March of 1982, although processor-to-processor communication and DL/1 will be available in September 1982.

Hardware confusion and implications

There is no doubt that SSX improves the 4331's ability to perform as a distributed machine. Coupled with the remote operation features announced in

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October it will be much easier to run a 370/type instruction set in a distributed environment without keeping systems programmers at each site. (Rumors persist that the IBM sales force paid for the so-called Hydra remote 4300 support facility because of frustrations with the 8100.)

Yet the confusion doesn't end with the 4300 vs. 8100 debate. The main holes in the IBM processor line are between the 4341-2 and the 3032. Just why IBM feels it needs eight machines in the relatively narrow 4300 range is not clear. (If nothing else, IBM has managed to make a total mess of its numbering system; we have the 4341-11 more powerful than the 4341-2, but less than the 4341-1, while the 4341-10 is less powerful than the 4341-1 and 4341-2.)

By next year the number will be down to seven, as the 4331-1 will be withdrawn from the market in February 1982, with no installation after December 1982. The 4331-2, on the other hand, looks more secure. It remains the only member of the 4331 family capable of using 3350 disks, and thus can act as a lead into the 4341 series, although it is not field upgradeable. IDC's latest migration data already is showing a significant amount of movement from 4331s to 4341s.

The old 4341-1 does however seem destined for a short life; the 4341-10 has almost the same power and is significantly cheaper. The only real difference is that the 4341-1 has an 8K buffer versus the 4341-10's 4K. Additionally, the Model 10 is only upgradeable to the 4341-11, not the 4341-1. Why the 4341-1 is being obsoleted remains a mystery.

The new 4321 is a bit of a puzzle in itself, appearing as a 4331-1 with a fixed configuration and a new number. It has the same processing speeds, memory size, I/O attachments, and communications facilities as the 4331-1, with roughly the same price. Apparently, IBM has decided that it is not in its interest to sell multiple versions for this size of system, and it is experimenting with the McDonalds-like one flavor, low overhead sales approach.

Although there is little in the announcement that suggests any master plan behind the new models, EDP/IR wonders why, if the only significant variations are in the buffer sizes, IBM did not introduce these products as new versions of existing models, as opposed to new models in the family. The machine cycle times for the 4341-10 and the 4341-1 are identical; the same is true for the 4341-11 and the 4341-2. Cynics would say that even IBM doesn't know what it's doing, citing the price cuts that make the the original 4300s actually cheaper than they were before the June 1981 price hikes.

The new emphasis on the scientific market and CAD/CAM

IBM has never been too pleased with its reputation for building scientific machines. But old labels are hard to shake, and thus the giant has been waging a steady campaign to stress 4300 and 3081 strength in scientific environments. The new releases stress scientific performance 10%-20% faster than in commercial work; IBM's emphasis seems more germane than the numbers themselves.

Certainly one of the reasons for this attention is CAD/CAM, which has given a whole new realm of possibility to the otherwise rather staid scientific/engineering market. No doubt you've heard the promises; a recent Fortune article came very close to calling CAD/CAM the nation's last hope for reasserting its manufacturing competitiveness.

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CAD TURNKEY SYSTEMS, APPLICATION SEGMENTATION, 1980
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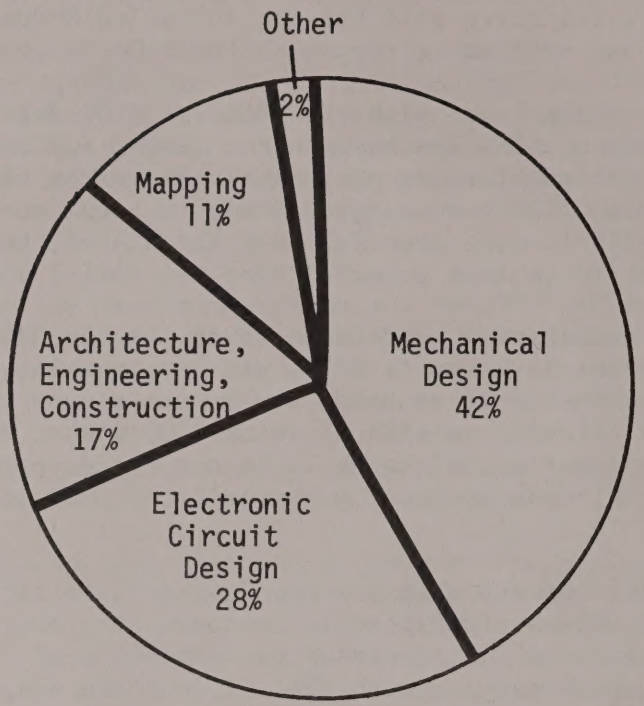

At this point, the term CAD/CAM is still somewhat of a misnomer as no commercially available system can perform both functions, and thus far the lion's share of the action has been on the CAD side of the virgule. True CAD/CAM, where all facets of the manufacturing process are linked to the data developed in the design work, is an incredible software and database challenge that is still far off in the future for most manufacturing concerns.

But even in its diminished form CAD/CAM should have no trouble cost justifying itself and growing into a substantial marketplace. International Data Corp., publisher of EDP/IR, expects that the CAD/CAM market for turnkey systems alone will grow at some 37%/year through 1985, when it will become a $2.8 billion business.

CAD/CAM systems can be had in four ways -- turnkey systems, service bureau offerings, packaged software or in-house development. Turnkey systems and in-house work have a head start on the market, but lately service bureaus, such as McAuto have been making some impressive overtures; IBM has given a boost to the packaged software market, and some software houses such as Manufacturing and Consulting Services (MCS) are getting into the service bureau business.

General Electric claims that it will be the shopping place for automated factory products, and will soon open five productivity centers equipped with Calma turnkey systems, GE robots, and numerical and programmable controllers. To help in the effort, GE has also acquired 48% of Structural Dynamics Research Corp. (SDRC), Cincinnati-based computer-aided engineering (CAE) experts.

As part of the deal, GE and SDRC will form a joint venture to be called General Electric CAE International, Inc., 51% controlled by GE. It will be a marketing group for both CAE and factory automation software; it will also sell products developed by General Electric Information Services Co.

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TYPICAL LARGE CAD TURNKEY SYSTEM COST STRUCTURE (12/80)
(Copyright 1981 -- International Data Corp.)

Component	$ Value	% Total Cost
CPU & Operating System	$100,000	28%
Workstation (3)	$120,000	33%
Application Software	$50,000	13%
Disk Drive	$35,000	10%
Plotter	$35,000	10%
Digitizer	$10,000	3%
Tape Drive	$10,000	3%
Total	$360,000	100%

IBM has been in the market for several years, selling the CADAM software developed by Lockheed way back in 1968. The CADAM interactive graphics package now runs under VM, as well as OS/VS1 and MVS; it needs at least a 4331-1. IBM charges either a one-time license of $14,000 plus $1,300/month, or a one-time fee of $78,000. CADAM is also sold by Lockheed and Fujitsu. In addition, as part of the recent 4300 announcements, IBM has added the following packages under its Installed User Program (IUP) policy:

- CATIA (Computer Graphics Aided Three-dimensional Interactive Application System) developed by Dassault Systems. CATIA runs under either OS/VS1 or MVS. Prices range from $1,470 to $3,150/month.

- CAEDS (Computer-aided Engineering Design System) provides graphics modeling and analysis capabilities for finite element structural/mechanical design evaluation. It runs under both VM and MVS and was developed by Structural Dynamic Research Corp. Monthly charges from $1,810 to $2,725, with one-time licenses from $6,695 to $13,870, and per terminal charges from $110 to $220 per month.

- CBDS (Circuit Board Design System) allows the engineer to design, develop, and document PC boards. From $2,100-$3,140 per month.

There is no doubt that IBM is trying to stress the 4300s as viable CAD/CAM machines. But with the exception of Computervision (which builds its own hardware) most of the turnkey systems shipped in 1980 were based on VAX 32-bit systems. Perhaps IBM's new software products are an attempt to lure users back into the fold, since, ultimately, the CAD/CAM market will be software driven.

Other mainframers are eyeing the market as well. CDC is selling CD-2000 which is a variant of a Manufacturing and Consulting Services (MCS) package, and is hitting the market with its Cybernet timesharing system; it is also working on a CAM package called ICAM designed to link CAD and CAM data bases. Regional CDC CAD/CAM training centers are scheduled to open in 1982.

Honeywell has also looked to MCS for mechanical drafting, numerical control, and geometric analyis software. DEC sells Sci-card's printed circuit board design software (although its reluctance to develop application software and compete with its OEMs will probably limit its role); Prime plans to link its Medusa CAD software to a numerical control system developed by Cadlinc, Inc., and Univac is expected to make a CAD/CAM announcement in the near future.

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• PRIME TAPS IBMer FOR TOP SLOT. Headless since Ken Fisher's resignation last July, Prime has tapped Joe M. Henson, a VP of management services for IBM's General System Division. The 48-year old Henson will take over from acting President John Buckner, who will return to his former post as VP finance, administration, and planning. During Fisher's absence the price of Prime stock fell almost 30%, and its P/E ratio dropped from over 30 to less than 20.

• THREE RIVERS TO SUPPORT ETHERNET LINKS. Three Rivers claims that its powerful 16-bit desktop system called Perq will run Pascal at 1 million instructions per second (1MIP). With that kind of power large files and fast printers are needed and thus some kind of resource sharing system is inevitable. Perq can now conform to Ethernet specs, offering a powerful networked, general-purpose desktop distributed intelligence system.

• UNIVAC GIVES NEW LOOK TO MINI OPERATION. The focus is now on DDP and OEMs. The Series V77 minicomputer staff will work more closely with the mainframe folks to improve Univac's ability to sell solutions. The OEM group says it will put more emphasis on application software developed by Univac, independents or current V77 users. Univac says it's working on its 32-bit mini entrant which will be fully compatible with the existing 16-bit V77.

• STARTUP GOES AFTER SUPER DENSE 5.25" FLOPPIES. Brown Disc Manufacturing, an unimpressive name with a more impressive cast will offer ultra-high recording densities for 96-170 track floppies using a "unique manufacturing process." The partners include: Ben Brown, former director of media manufacturing operations at DEC; Robert Pretko, an oxide media expert also from DEC, and George Kriegler, an engineering manager at CDC for both flexible and rigid media. Other DEC and CDC people fill out most of the supporting troupe. The company is located in Colorado Springs and is relying on venture capital.

• AT&T DESCRIBES FIRST GLIMPSE OF BABY BELL. The fully separate subsidiary will have a humble beginning consisting of merely 850 employees for the initial operation. The unit will be formed on or before June of 1982, and will begin offering services by January 1983, in compliance with the Computer Inquiry II ruling. All initial capital will come from Bell and AT&T estimates that $434 million will be sufficient to finance operations from 1982 thru 1985. Ma Bell will bestow an initial $3 million in cash and $56 million in assets on its subsidiary, amounts far less than most observers had expected. All this is still pending FCC approval and numerous judicial and legislative obstacles.

• HOW WILL STRATUS CHASE TANDEM? Stratus Computer has entered the fault-tolerant 32-bit supermini business with its redundant Stratus/32 Continuous Processing System. According to Stratus, Tandem's software-based redundancy chews up too much CPU time, degrading system performance in high-volume applications, and thus Stratus is basing its attack on parallel processing, hoping that long-term hardware cost declines will work in its favor. Among the features: up to 8 MB main memory, 64 terminals, and 16 disk drives for each processor, from one to 32 processors (each with two CPUs) that can be linked in a ring network by the 2.8 MB/sec Stratalink, and fully redundant power supply. Each processor contains four Motorola 68000s and 64K memory chips. In power, Stratus compares the Model 32 to the VAX 780, Prime 750, and the Tandem Nonstop II, with prices in this range starting at $123,350.

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EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"The Gray Sheet"

MOLLY UPTON, EDITOR NOVEMBER 23, 1981 ● VOL.17,NO.14 P.J. MCGOVERN, PUBLISHER

IBM, PCMs shift prices -- Page 6

GIANTS MOVE IN ON VIDEOTEX MARKET AS TRANSACTIONAL SERVICES GRAB CENTER STAGE

How do you figure videotex? On the one hand, only huge government subsidies keep the British Prestel system from going belly up, Ted Turner's 24-hour news system is floundering in the red, the Source and Micronet struggle, and a host of prototypes show real doubts about the demand for home information services.

On the other hand, giants like CBS, NBC, Sears, AT&T, and even IBM have begun to show new interest in videotex. Even with no profits in sight, communications vendors, database publishers, service bureaus, and terminal manufacturers are finding it hard to resist the lure of 77 million households with 124 million television sets. Surely the information industry has something other than silly games to sell to these people, and for those who figure out what, the rewards will be great.

In its neophyte condition, videotex has had almost every problem imaginable -- confusing nomenclature, lack of standards, legal entanglements, dubious product strategies, pricing problems, and lots of red ink. Much of the chaos remains, with the following key concerns still unresolved:

- Delivery systems. Teletext, videotex, and cable TV have different costs, standards, players, and potential. Which will be used first? Which will prevail? And where does Ma Bell fit in?

- Regulation. Who can get into the CATV market? Who will be considered a common carrier? Who will be allowed to provide information and how will limited capacity be allocated?

- Transactional services. As the evidence comes in, banking, shopping, real estate, and other transactional services look like an essential part of any viable home market product.

Despite these obstacles, the recent activity is noteworthy. AT&T will launch a joint venture with CBS; IBM will market a Series/1 based system in the U.K. aimed at the business market; Sears is buying into the cable business; and the major New York banks continue to play with home banking.

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Of teletext, videotex, and cable

Delivery of information to the homes can take three basic forms. The simplest is the receive-only teletext, where a TV signal is broadcast to the vertical blanking interval (VBI) of the TV set. (Teletext information can also be transmitted via CATV or telephone lines.) The receiver then uses a small decoder to select the desired information, although in some so-called teletext experiments the information merely scrolls sequentially with the users having no selection capabilities. The user cannot interact with the information source in any way. The VBI can support about 200 pages of text.

The British have been the teletext leader. A subset of the Prestel videotex system, British teletext has both the lowest cost and most readily available components, with capabilities exceeding those envisioned by existing teletext experiments. Probably the most successful teletext-type experiment in the U.S. has been the Keyfax service in Chicago where a constantly rolling mass of news, weather, sports, finance, etc. claims to average 75,000 viewers a night, and is even managing to sell space to advertisers. The so-called Night Owl service is, however, broadcast over a regular UHF channel not the VBI; it is offered by Field Electronic Publishing.

Videotex (it's chic to leave the final "t" off) is an interactive service that is essentially teletext with telephone/modem response capability. Bell's experiment with Knight-Ridder in Coral Gables, Fla. is the best known U.S. example. Users initiate all requests. Since two-way capabilities are necessary for transactional services, most vendors' attention has focused on videotex.

Canada (Telidon), Great Britain (Prestel), and France (Antiope) have developed national videotex systems and standards. AT&T endorsed Telidon for its U.S. ventures (the so-called North American standard), and shortly thereafter France made its system Telidon compatible. Siemens recently spent $10 million to acquire Telidon technology to add to its videotex systems. Telidon hardware sales are handled by Norpak and the software by Infomart. The British will try to make Prestel Telidon-compatible, but still sees a future for it in the U.S.

Bell claims Telidon is more efficent and has better graphics, but it costs some $700 per TV compared to $150 for Prestel. Some 85% of the videotex terminals in use around the world rely on the Prestel technology.

Besides its high price, a second potential drawback to any videotex system is that when in use videotex will tie up both the TV and the phone. Since most videotex services will, at least initially, go to the relatively affluent, the TV use may not be a problem since many of these households have more than one set. But unless Bell changes its pricing of multiple consumer lines, use of two-way videotex will have an uncertain future.

Two-way cable has perhaps the greatest potential of any home technology, but it is also the furthest off in the future. A single video channel can supply up to 10,000 pages of information, and communications cost for two-way traffic will be less than for phone line service. Warner Amex's Qube is the leader in this market. Unfortunately, less than 2% of the nation is wired for two-way cable although 25% have one-way cable traffic. Estimates of 80% penetration by 1990 are not uncommon, and because of intense competition for new franchises much of this new construction will be two-way, but many key areas have already been wired, and will remain one-way for the foreseeable future.

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MAJOR VIDEOTEX EXPERIMENTS IN U.S. AND AROUND THE WORLD

Vendor	Name	Start-up	Locale	Users
Bell Canada	Vista	2nd Qtr. 1981	Montreal/Toronto	500
Deutsche/ Bundesport	Bildschirmtext	June 1980	Berlin/ Dusseldorf	6,000
Dutch PTT	Viditel	August 1980	Netherlands	4,000
French PTT	Teletel	April 1981	Velizy	2,500
Japanese PTT	Captains	Dec. 1979	Tokyo	1,000
Dow Jones	News Retrieval	1977	U.S., Canada	25,000
CompuServe	Info. Service	July 1979	U.S.	12,000
Source Telecomputing	The Source	June 1979	U.S., Can. Australia	11,500
British Telecom	Prestel	Oct. 1978	UK	11,500
AT&T/Knight-Ridder	Viewtron	Mid-1983	Florida	5,000
Deutsche/ Bundesport	Bildschimtext	1982	Ten cities	40,000
French PTT	Electronic Directory	1982	Ille-et Vilaine	250,000
TELESP	Antiope	1982	Brazil	1,500

Source: Link

Regulatory rag ... more than the same old beat

The current regulatory debate centers around more than the usual debate over what AT&T will and won't be allowed to do, but as usual Bell is a major concern. Both videotex and cable have their own particular concerns.

After much debate it looks like the FCC will allow the major TV networks to get into the CATV business, but it won't let Ma Bell. It also looks like Bell won't become an information provider in the near future. Bell's planned Austin, Texas electronic Yellow Page Texas experiment was withdrawn because of local newspaper protests, and Congress seems wary of Bell's potential monopoly of the information market.

AT&T's tie with CBS indicates Bell's restraint; CBS will supply the information and Bell the transmission. CBS has interests in publishing, music, and now CATV. ABC is working with Westinghouse which recently bought Teleprompter, one of the nation's largest CATV operations. NBC, and its parent RCA, has lagged behind, but is testing Teletext in the Los Angeles area; it also has a major videodisk operation which has yet to meet corporate expectations.

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But as these and other potential providers look at the delivery of both teletext and videotex, legal questions abound. Does the Vertical Blanking Interval (VBI) belong to the broadcaster or is it a public good that should be licensed? If the broadcaster rents the VBI to anyone who wants it, does the broadcaster become a common carrier? Different laws apply to newspapers vs. TV -- such as equal time, political access, etc. -- if the VBI contains actual newspaper text, which laws apply?

Similar problems can occur with cable. Most cable systems are intrastate operations; if the cable vendor offers a channel to any videotex provider who will pay for it, doesn't that make CATV an intrastate common carrier whose rates should be regulated by a local utility commission? Could there be fifty different regulators? After all the Communications Act says that the FCC cannot preempt intrastate regulation of wholly intrastate common carriers. The first of many expected legal snafus have already begun.

IBM's stirrings

In the UK sometime in November, IBM is expected to announce its first move into the commercial videotex market. Called the IBM Database, the machine is designed for private industrial applications. A Series/1-based system will be able to store up to 350,000 frames of information. Sources indicate that IBM's strategy is to test interest by approaching existing Series/1 users. Though the system is based on Prestel technology, IBM has added extra security, data entry edit capability, and enhanced message exchange facilities. A minimum 256K version would support eight to ten users and cost about $55,000.

The results from Columbus and France

In October of 1980 OCLC, a non-profit library service group and Bank One undertook a joint videotex project involving 141 randomly selected households. Users were given a decoder, keypad, connective wiring and an installation guide; connections were made to an unmodified TV set in the manner of today's video games. The service included transactional services, such as bill paying and catalog shopping, and informational services including an Encyclopedia, the card category of the local library, and several community events calendars.

At the end of the test, the sample was asked to rate the various services and the results of that survey are summarized in the chart below:

For usefulness	Worth paying for	Would pay $3/month for
1) Bill payment	1) Encyclopedia	1) Home Security
2) Public Information	2) Video Catalog	2) In-home computer
3) Video Catalog	3) Home banking	3) Video games
4) Balance Inquiry	4) Public Information	4) Library services
5) Bank statement	5) Columbus Calendar	5) Catalog
6) Encyclopedia	6) Math tutor	6) Contact Doctor
7) Columbus Calendar	7) Reading tutor	7) Adult education
8) Math tutor		8) Encyclopedia
9) Reading tutor		9) Energy control
		10) Bill payment

The strength of transactional services in columns two and three is as noteworthy as the cool reception of self-help services and community news. OCLC

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is convinced that transactional services are the way to go. (The high security rating is impressive, but the price is too low; who wouldn't pay $3/month for a security monitoring system?)

EDP/IR believes that home shopping is a sleeper. Within the advertising trade, experts drool over the "impulse buying" possibilites of videotex; Pricing services (i.e., list the price of a Sony Trinitrons in stores near the user) such as that already being offered by Compu-Card will also be popular. Videotex also opens new advertising techniques, such as pictures of available real estate, or samples from new novels or magazines. Sears already has its catalog on videodisk, complete with color, motion, sound, and Cheryl Tiegs.

Compu-Card is also aggressively pursuing the video-shopping market. It is planning several videodisk experiments over the next few months. One of these will put videodisk machines in participating stores so that shoppers can see items not in stock, and can place orders if they choose. An off-shoot of this thinking may set up Compu-Card booths in shopping malls, so that consumers can price compare with the Compu-Card data base and place orders via phone.

The company is also believed to be building a video-shopping service for CATV providers. For the last four months it has been involved in a pilot project with Times/Mirror Cable testing the so-called "infomercial" concept, i.e., a 15-minute show on home maintenance by Stanley tools, where the content attempts to be useful and all the tools shown are made by Stanley.

What's going on in France

Reactions to the various French experiments in mass market systems have ranged from jealousy to ridicule, and these mixed messages were further complicated by the recent election of a Socialist government headed by Francois Mitterand. In July in the town of Velizy the French commenced their Teletel project, their most ambitious videotex experiment to date, and the politicians on hand clarified the new government's attitudes to videotex.

Surprisingly, there seems to be a new emphasis on exports. Originally, the scheme seemed to call for large government contracts to major French firms such as Thomson, Matra and Cap Sogeti, but now these firms are establishing their own marketing forces, and are moving ahead on both domestic and international fronts without necessarily waiting for government initiative. Expect the French to push low cost Ascii and videotex terminals as well as software for gateways, electronic mail, and turnkey videotex systems.

The government also seems to have pulled back on its commitment. The new Minister of Posts and Telecommunications, M. Mexandeau, is calling Teletel a test and saying that it won't force videotex upon resistant consumers. Previously, there had been talk of replacing all phone books as early as 1990.

As for the test itself, an initial mailing to 25,000 homes received 8,000 responses from willing participants. Of this group, 2,500 were selected and given free decoders, leaving the users with only a .10¢/five minute line charge for access to some 200,000 pages of database information. Some 2,100 participants will get adapters for their color TV sets, and 400 will be given black and white terminals. Three hundred users will be equipped with "smart card" facilities. Overall, the French estimate that they have spent some $8 million on the Teletel project. The project's results will eventually be made public.

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PRICE PERFORMANCE RATINGS, IBM AND PCM MANUFACTURERS
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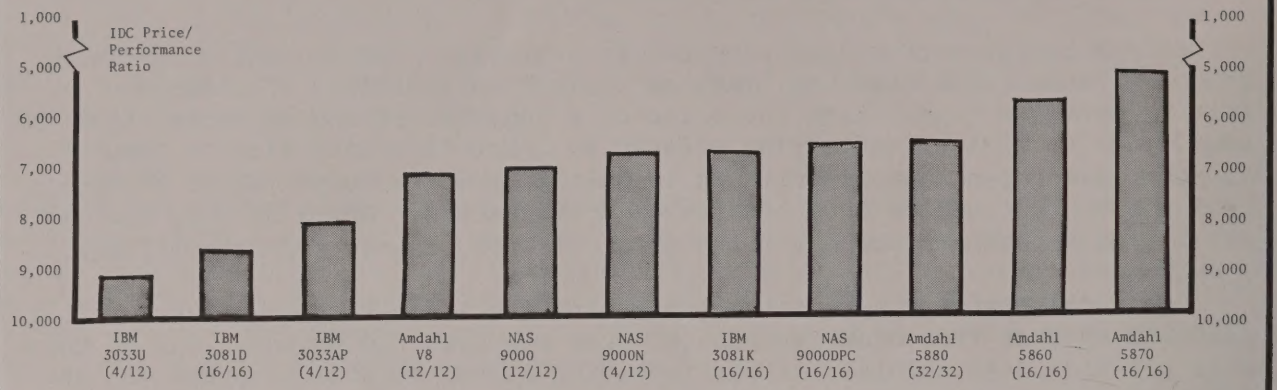

NOTE: IDC's price/performance ratings are determined by dividing the price of the specified configurations by IDC's relative power ratings. As such they are subject to change either through changes in the IDC ratings or in vendor pricing. Configurations include CPU, console, memory, channels, and other necessary attachments. The numbers in parenthesis below each model number refer to the size of the main memory and the number of channels, respectively.

PCMS REACT TO IBM 3081K AND PRICE MOVES, MAKE SMALL CUTS TO MAINTAIN PRICE/PERFORMANCE EDGE

Despite the many price cuts and performance improvements that came with IBM's announcement of the 3081K, PCM manufacturers have been able to maintain their traditional price/performance edge without much strain. At the high-end, both Amdahl and National Advanced Systems thought that the power of the 3081K warranted price cuts; Amdahl cut the 5860 5% and NAS cut its 9000 DPC line 7%. As expected, the largest PCM price cuts were in the 3033 end of the spectrum.

The chart above shows that only the 3081K is in the price/performance range of the PCM mainframes; the 3081D does not show up well at all. The newly announced Amdahl 5870 looks like the winner, except that it won't be available until the third quarter of 1983.

In the area of maintenance, in an effort to spur purchases IBM has cut rates on the entire 303X series by from 11% to 15%, with the latter being the most common. But despite the cuts, the percent of total expenditures due to maintenance still shrinks as the machines gets larger.

For example, annual hardware maintenace on a 3081K with 32 megabytes and 24 channels is $120,318. The machine itself costs $5,153,400, making maintenance's percentage 2.3%. If you take a 3033U (24 MB, 16 channels, the amount spent on maintenance is 3.5%; while for a 3033S (4MB, 6 channels) the figure is 5.2%.

As for software, EDP/IR estimates that when IMS DB/DC is in use, $8,000 per month is a very conservative estimate of monthly software and support charges for users of MVS/SP Version 1.3. With the move to the new MVS extended architecture this figure will rise to at least $11,500/month and will go higher if existing stalwarts like IMS, VTAM, TSO, etc. come out with new and more expensive versions designed to take advantage of the new 31-bit addressing.

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PRICE COMPARISONS, IBM, PCM, LARGE SYSTEMS
(Prices as of 11/25/81)
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Model	IDC Performance Rating	Old Price $ Millions	New Price $ Millions	%Δ
3081K 16M/16C	675	-	4,603	-
3081K 32M/24C		-	5,153	-
3081D 16M/16C	465	4,003	4,003	0
3081D 32M/16C		4,403	4,403	0
3033 AP 4M/12C	405	3,730	3,328	11%
3033AP 24M/18C		5,215	4,788	8%
3033U 4M/12C	237	2,425	2,168	11%
3033U 24M/16C		3,649	3,372	8%
3033N 4M/16C	210	1,750	1,560	11%
3033N 16M/12C		2,458	2,243	9%
3033S 4M/6C	132	1,190	1,190	0
3033S 16M/12C		-	1,873	

Model	IDC Performance Rating	Old Price $ Millions	New Price $ Millions	%Δ
AS9000 DPC 16M/16C	708	4,975	4,650	7%
AS9000 DPC 32M/24C		5,525	5,200	6%
AS9000 12M/12C	393	2,975	2,750	8%
AS9000 24M/16C		3,525	3,300	7%
AS9000N 4M/12C	314	2,145	2,145	0
AS9000N 24M/16C		2,895	2,895	0

Model	IDC Performance Rating	Old Price $ Millions	New Price $ Millions	%Δ
Amdahl 5880 32M/32C	1085	7,500	7,100	6%
Amdahl 5870 16M/16C	1055	-	5,400	-
Amdahl 5870 32M/16C		-	5,800	-
Amdahl 5860 16M/16C	620	3,800	3,600	5%
Amdahl 5860 32M/16C		4,200	4,000	5%
Amdahl V8 12M/12C	310	2,475	2,225	11%
Amdahl V8 24M/16C		3,200	2,975	8%

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• IBM DROPS FIXED HEAD DRIVES. Whatever solved the 3380 head problems apparently could not be applied to the fixed head versions. The fixed head models were not popular anyway and IBM could do without the expense of developing them; so could the PCMs like STC and Memorex. The fixed heads are used for faster access speeds and carry a higher price tag, but the new cache systems announced in October provide a more cost effective solution.

• WANG GETS NATIONAL SEMI KNOW-HOW. Wang has been a long time customer of National Semiconductor's memory, microprocessor, and logic chips, and is now being rewarded with National's licenses and periodic updates for its XMOS manufacturing process to be used in Wang's custom LSI circuits. XMOS is used in the NS16000 16-bit microprocessors and certain high-speed memory components. National will provide volume production once the development work at Wang's new Corporate Technology Center (Lowell, MA) is through. Wang will serve as its own backup manufacturer.

• INTEL CUTS PRICES, GETS SECOND SOURCE FOR BUBBLES. Prices for the 8086 have been reduced by an average of 22%. The price for the 5MHz 8086 is now $58.50, while the 10MHz 8086-1 is $127.40. With seven 8086 second sources, more price drops can certainly be expected. (Second sources now include AMD, Fujitsu, Siemens, NEC, Mitsubishi, Harris, and Matra-Harris.) Intel is now noting the 8086's "apparent trend toward standardization." The company also reports that prices for the 64K EPROMs will be cut to $16 by early next year, compared to current prices in the $23 to $40 range. When this happens the 64K 2764s will gain price parity with Intel's 2716s on a per bit basis. 2716s now cost $4 and Intel says it does not anticipate significant further reductions. Intel likes to preannounce prices in order to encourage designers to incorporate the company's most advanced products.

Intel has also announced that it has signed up Mitel as a second source for Intel's 7710 one-megabit bubble memory. Mitel will use the bubbles internally as part of its SX-2000 digital switching system and will also sell to OEMs. Mitel says other telecommunications vendors will start to use bubbles in their products. Intel recognizes that Mitel's limited operation will not solve its second source problem and says it will announce another second source before the end of the year. Mitel will make its bubbles in Ottawa, Canada.

• IBM BUYS UP TAX CREDITS. Ford, B.F. Goodrich and CSX have sold tax credits to IBM for a total of some $200 million. Both Goodrich and CSX say they'd rather have the money now than get it spread out over time through depreciation allowances. Ford, which lost money this year, had no use for its tax credits. For IBM the sums involved are small, and many analysts see the move more as a symbol of power and aggression than of any major plan to restructure its financial balance sheet.

• AT&T DUBS WESTERN ELECTRIC FOR FIBER OPTICS, REJECTS LOWER FUJITSU BID. U.S complaints about the Japanese unwillingness to buy telecommunication products from U.S. vendors now ring a little hollow. Although much is being kept secret, it is well known that Fujitsu had the lowest bid to provide fiber optic cable for Bell's 250 mile New York-Boston trunk. Congressional fears of "national interest" and FCC worries about dumping were apparently enough to convince Bell to give the $75 million deal to Western Electric.

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NEW 3081, MVS ARCHITECTURE BEEF UP HIGH END; CAN PCMS MEET MICROCODE CHALLENGE?

The 3081 has finally stepped out of the telephone booth. Having entered as a mere big brother in the 3033 family, it now wields powers akin to but not yet at the price/performance levels shown by the 4300 series. With the introduction of its new MVS extended architecture IBM has taken a necessary step toward the future and thrown up a tricky road block for PCMs who wish to compete in the high-end CPU marketplace.

Is IBM backing off from the 4300 challenge? Although the 3081K is rated at 30% to 40% higher performance than the previously announced 3081D for a mere 15% in purchase price, it falls short of the original 4300 price/performance band. It looks like the new machine's performance is being understated, especially in scientific environments, where the "K" may offer almost twice the "D's" performance.

But perhaps more important, the new MVS/XA (extended architecture) finally moves IBM into the area of 31-bit addressing, allowing MVS to address up to 2 gigabytes of storage. By running the MVS/XA under a VM support program, users can gradually shift applications to the new architecture. Among the major products woven from strands of hardware, microcode and software:

- New 3880 model 11 and 13 storage subsystems for use with the 3350 and 3380, respectively. The devices offer a cache of up to 8 Mbytes, which will present data to the CPU at channel, as opposed to disk access, speeds.

- Better support for tightly coupled systems in Jes 3 environments via MVS/SP Version 1 Release 3. Does IBM plan quadratic processors?

- Remote control of 4300s. The so-called Hydra is a real boost to DDPers, as IML and IPL can be handled remotely through 3275 communications, lessening the need for on-site programmers. Only power up/down functions cannot be controlled by the host.

- Changes in the 303X line. Emphasis is on the 3033S; "S" users get a free 10% performance boost and can now migrate directly to the "U", skipping the "N." 303X purchase prices dropped 8% to 12%.

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CURRENT DOLLARS CERTAINLY BUY MORE HARDWARE

Wow. No doubt about it, IBM has indeed reduced hardware prices on its 303X line over the years. A look at the price/performance chart on page 3 indicates some startling conclusions.

Did you know that now, with the latest price reductions on the 303X line, one can buy from IBM the biggest 3033U one would ever want for less than the original price of the smallest 3033U? The same is true of the 3031 and 3032. In fact, in some instances there is a gap between the prices of the new big systems and the old small systems.

The 3031 and 3032 are, not surprisingly, "not in new production." The fact is, the 4341-2 and the 3033S both offer viable alternatives to the 3031 and the 3033S now seems to be the way to go instead of a 3032. The N isn't slated for a long life, as users can now get 16 Mbytes on a 3033S and upgrade directly to a U.

Although hardware price/performance ratios are improving across the board, it is the Amdahl 5860 and 5870 that in fact made it into the band established by the 4300s. IBM's K as well as all of NAS' 9000 series made it into the action-packed "bridge" band, which can also be thought of as the lower end of the 303X price arena.

However, although price/performance ratios are improving, the user will pay in terms of microcode and software features.

Inside the 3081K

There is little doubt that the latent power of the new 3081K was held back in order to make 3033s look like a more viable buy until IBM was ready to deliver 3081s in volume. IBM's Richard Williams, director of planning, Data Systems Division, said by second quarter 1982 IBM will be able to ship 3081Ks in volumes "comparable to the 3033s at their peak." The day of the announcement, Williams was coincidentally speaking to large users at the Enterprise Systems Forum in Phoenix. Thus IBM will not have to rely on sales of high-end 3033s to bolster revenues. Users scheduled to take delivery of 3081Ds after June may change to a "K" and retain their original delivery dates.

The purchase/lease ratio is 37, encouraging purchases, compared to the "D's" ratio of 40. Unless price cuts for the "D" are forthcoming, most users will go for the "K," with current "D" users opting for field upgrades.

The 30% to 40% improved processing power is attributed to the new 64K buffer (twice that of the D) in each of the diadic processors, and "improved instruction processing organization." The buffers have the ability to swap data between each other. The main memory, number of channels, and internal speeds are identical in the "D" and "K."

All upgrades to the "K" can made inside the existing "D" box, and IBM estimates that upgrades from the "D" to the "K" can usually be done within 14 to 28 hours. IBM says it held back the "K" version because it wanted to make sure of the basic 3081 design in the "D." According to IBM, 3081 installations and tests have been "remarkably error free," to the point of not fully testing the system's built-in diagnostic capabilities.

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PRICE VS. PERFORMANCE
CENTRAL ELECTRONIC COMPLEX
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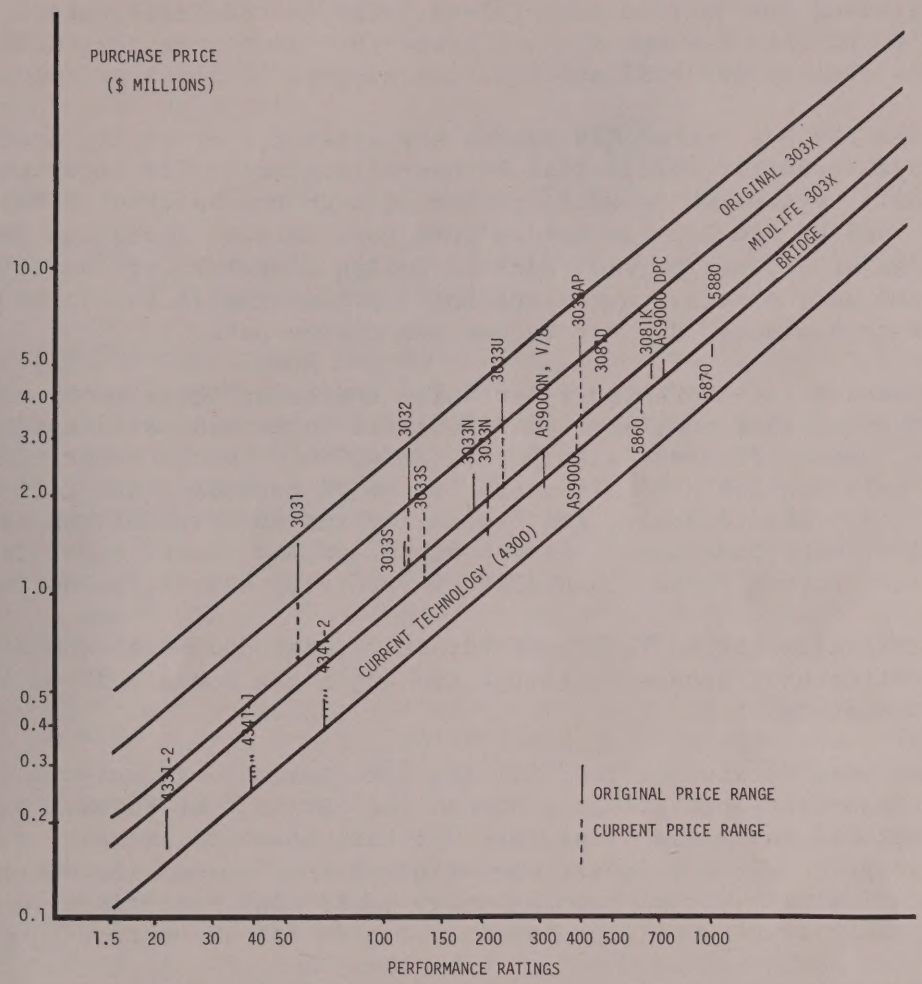

CPU RELATIVE PERFORMANCE UPDATE
(Copyright 1981 - International Data Corp.)

CPU	Rating	CPU	Rating	CPU	Rating
IBM 4331-1	11	IBM 3033S*	132	NAS 9000N	314
4331-2	22	3033N	210	9000	393
4341-1	40	3033U	237	9000DPC	708
4341-2	66	3033A	405		
				Amdahl 5860 ('82)	620
IBM 3031	54	IBM 3081D	465	5870 ('83)	1055
3032	124	3081K ('82)	675	5880 ('83)	1085

IDC's power ratings are relative to each other with the basis being a 158 Mod 3 having a power rating of 45. S* was boosted to reflect the free 10% performance enhancement. Examining the numbers, it looks like a lower end 3081 probably with a power rating in the low 300s would make sense. IDC also sees room for a larger 4300 machine, probably a 4351.

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And the new architecture

The two most serious weaknesses of IBM's existing 24-bit architecture are its inability to address more than 32 Mbytes, and its inappropriateness for the fast growing interactive marketplace. The latter has, in fact, been more glaring for MVS than for the oft neglected VM. Under the new VM/SP High Performance option, the 3033 and 3081 can support 32 Mbyte main memory.

Although IBM has pushed MVS as its key strategic operating system for some time, a loyal group of influential VM users persists. For interactive and user-friendly systems VM is often preferred over the batch-oriented MVS. (One reason is that VM usually can handle more terminals.) Among the large VM users are major service bureaus such as Boeing Computer Services, Informatics, Tymshare and many others. But since batch processing is still the heart of the mainframe business, MVS has become the chosen path.

As announced the MVS/XA only partially addresses these problems. MVS does use 31-bit processing enabling up to 2 Gbytes to be addressed and it doubles the maximum number of devices supported to 4,080. On the other hand, the capability is only available to MVS users; large VM customers are left out, at least for now. Additionally, the complexity and overhead of MVS will remain intact and even be increased. As expected, IBM has chosen to build bridges to its new architecture rather than alienate users by obsoleting software assets.

(Note: MVS/XA is called 31-bit architecture, as opposed to the more common 32-bit architecture, because although the registers contain 32-bits, one bit is used as a sign bit.)

IBM has been careful to reaffirm its commitment to VM, saying that enhancements will continue, but it has given no indication that VM will be able to support expanded addressing features. It has, however, improved the ability of VM to support MVS as a "guest operating system," promising 90% of native performance for MVS systems running under VM/SP High Performance Option. Perhaps such guest systems will evolve into a path for VM users.

VM is also essential to the smooth installation of MVS/XA. A VM/XA Migration Aid is the key to the conversion process. The VM operating system can divide an MVS machine into logical units so that each user has the illusion of controlling the entire machine (hence the acronym for Virtual Machine). By running MVS/SP and MVS/XA under VM/XA users can logically partition the MVS/370 work and the MVS/XA work, and thus perform major testing and debugging without requiring a dedicated machine. Lest there be any confusion, VM/XA is not a guest operating system; it does not support VM functions such as remote terminals, CMS, 3705s, etc. It is strictly a virtual machine testing facility.

IBM stresses that the conversion to MVS/XA is "evolutionary" and that most applications running on a 370 or 3033 can be moved to the 3081 XA environment without modification. IBM is referring to XA as a "second native mode that offers significant advantages for those applications designed for its specialized capabilities." In IBM jargon, MVS/System Product Version 2 supports XA, while MVS System Product Version 1 supports the 370 mode. 24-bit and 31-bit programs can execute concurrently due to the "bimodal" nature of the architecture and IBM will "enhance selected subsystems and program products to use the 31-bit addressing capabilities." Should be interesting to see what evolves for the "second native mode."

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AMDAHL RESPONDS WITH 5870

It only took Amdahl Corp. six days to make its response to the 3081K. The Model 5870 uses an attached processor to the 560 to yield 70% more power than the 5860, putting it very close to the 5880 multiprocessor. (The difference between an attached and a multiprocessor is that the attached does not have its own channels and memory.)

The hardware is of course the easy part. As for the extended architecture, Amdahl says that it will be able to support the XA on all of the 580 series machines, and "possibly" on the 470 machines as well. Amdahl claims that its CPUs have been built for 31-bit addressing all along, but haven't been able to use it because of IBM's operating systems.

As for aping the microcoded XA, Amdahl says it doesn't anticipate major problems, but it won't get to look at the IBM product until first quarter 1983 when the first XA is delivered to IBM customers. Amdahl says XA support will not be all that urgent, pointing out that the VM/XA migration aid will not be available until fourth quarter 1983, and that even then the conversion process will be slow and complicated, perhaps as difficult as the original move to MVS. Amdahl is confident that the large commercial customers will not be the first to make the move, and that it will be ready in plenty of time. As for the 470 series, Amdahl says "it intends" to put the XA on these machines but will review the matter upon examination of the MVS/SP-2 software.

A minimum 5870 configuration, including 18 I/O channels and 16 Mbyte main storage will cost $5.4 million, including first year maintenance. The maximum 34 channel, and 32 Mbyte version will cost $6.1 million. Four-year U.S. lease prices range from $135,525 to $153,425, and two-year leases are from $169,400 to 191,750. First shipments of the 5870 will be in the third quarter of 1983. Amdahl also announced price cuts for its current 580 and 470 systems. Purchase prices for the 5860 and 5880 were cut 5% and leases raised 3%. Purchase prices for 470 V/7 and V/8 have been cut about 12%, and cuts on other 470 systems ranged from 4% to 14%. No word yet from the Japanese PCMs.

However, the need for the VM/XA product (which won't be available until the fourth quarter of 1983) suggests that the move to MVS/XA may not be as smooth as the hardware announcements and the nomenclature would have one believe. XA is installed by loading microcode on top of MVS/SP Version 2.

Though most current programs can use both architectures, IBM has said that the true value of MVS/XA "will be more fully realized as new subsystems and applications take advantage of its extended range." In other words, expect programs that run only on XA to be forthcoming, posing a serious threat to the PCMs, who may find it difficult to replicate IBM's complex interweaving of hardware, software, and microcode. When asked if the PCMs would be able to ape the new XA, an IBM executive replied "I don't see how they can."

It's possible some users won't need the MVS/XA. IBM indicated XA can be responsible for "dramatic" performance boosts not in well balanced systems but in those environments that are constrained by lack of adequate virtual storage or device definition. However, additional real storage is needed to satiate MVS/SP V2. IBM estimates the Version 2 will need at least 1 Mbyte over Version 1 Release 3. More performance information will be available in 1983.

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XA's dynamic channel system

It is clear that most of XA has yet to be seen. Nevertheless, the new architecture does boast several immediate advantages. In addition to the larger address space and increased number of terminals, IBM has developed a dynamic channel system.

Termed an "evolutionary departure from the 370 approach" the new channel subsystem offloads I/O processing from the CPU. A substantial amount of I/O programming has been replaced by this microcoded subsystem, freeing up CPU space. Because channel paths are now managed by the subsystem, any channel can be hooked to any processor simplifying configuration tasks. Without XA, each channel is assigned to one of the two CPUs. By improving the likelihood of finding an open path to the CPU, throughput and response time should improve. Other I/O improvements include more sophisticated reporting, reduced interrupts, and shorter path lengths. Existing channel programs will execute unchanged.

Availability and prices

First customer shipments of the 3081K and the improved 3033S machines are scheduled for the second quarter of 1982. The purchase price for 3081K with 16 channels and 16 MByte main storage is $4.6 million; the 32 Mbyte version, also with 16 channels, goes for $5 million. The 3033S can double its memory to 16 Mbytes; that configuration has a purchase price of $1.4 million.

To no one's surprise, software does not come for free. In fact, the costs of software licenses and its support are becoming sizeable indeed. The "new" MVS is officially called MVS/SP Version 2, which when coupled with the Data Facility Product is termed MVS/XA. MVS/XA (JES 2) has an initial one-time charge of $12,000, a monthly license fee of $4,000, plus a monthly support charge of $500. JES 3 starts at $13,500, plus $4,500 month, and $1,000/month for support. Thus the support and maintenance for JES 3 will run to $66,000/year. The VM/XA migration aid will not be available until the fourth quarter of 1983. Basic license fee for VM/XA is $10,500, with a monthly charge of $3,500, and a support charge of $500/month.

3880s ... first step toward backend processor?

IBM's new storage control systems look a bit like the Virtual Shared Storage system announced by Storage Technology this summer (EDP/IR, Sept. 23). Both systems put a large cache memory as a buffer between DASD devices and the CPU, with the idea being that algorithms will keep the right data in the cache so that the CPU can be fed at channel as opposed to disk access speeds. STC also concentrates on physical data management techniques such as data compression and less use of tape. IBM, at least for now, is concentrating merely on throughput and response.

IBM has come out with two different models, both of which will eventually be supported by the MVS/XA. The 3880 Model 11 is most important where paging and swapping are important performance factors. It performs all the functions of the old 3880 Model 1 and in addition has an 8 Mbyte cache which will serve up paging data from up to four 3350 disk drives -- a built in "directory" identifies information in the cache. It can be attached to any IBM mainframe through 1.5-, 2-, or 3 Mbyte/sec block multiplexor channels. The 11 will supported under MVS/SP Release 3.1 (April 1982) and VM/SP High Performance

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Option Release 3 (first quarter 1983). Most 3880 model 1s will be convertible to the Model 11, with upgrades going for $175,000. Initial deliveries will be in April 1982. Purchase price is $251,520.

The Model 13 is designed for the 3380 disks and currently is available only to MVS/SP Version 1 users. It is tailored for application and non-paging system data. Its cache can be from 4- to 8 Mbytes and can support one or two strings of 3380s on 3000 series processors with 3 Mbyte/sec channels. Conversions to the Model 13 can be made from the Model 3. Prices are $202,640 for the 4 Mbyte version and $260,880 for the 8 Mbyte; upgrades from the Model 3 cost between $126,000 and $185,000.

The Hydra comes to DDP

Is IBM dissatisfied with the 8100? Once the sole bearer of IBM's DDP strategy, the 8100 has had its problems, and IBM now seems to be hedging its bets by making the 4300s a more viable DDP alternative.

Previously, potential users of remote IBM 4300 machines have wondered why they should distribute their machines if they had to distribute their staff as well. Keeping one, and often two, skilled on-site programmers to nurse along a 4300 is in many cases not an efficient allocation of resources. The 8100 as an intelligent controller seemed to make more sense, at least from a staff resources point-of-view.

But now a free Remote Operator Console Facility will allow an operator at the host to perform IML, IPL, and other control functions via a dial up remote 3275 display or a 3275 emulating program. Only power on/off must be performed at the remote site. The control program will run on both VM/pass through and a new MVS Operator Communication Control Facility (OCCF). In theory, on-site personnel will only be responsible for such mundane tasks as changing disks and paper, offering big savings on operator salaries.

Depending upon whether you like 370 operating systems, use of the 4300 is an advantage or disadvantage compared to the 8100, which has its own operating system and its own operating system problems, requiring lots of custom programming. The Hydra can run with 4300s using VM, MVS, VS1, or VSE. The necessary engineering changes will become available in December 1981.

Though EDP/IR still believes that IBM does consider the 8100 to be long term strategic product, especially in the office, a VM 4300 on-site will probably become an attractive product as communications and personnel costs continue to rise. Some say it's the first step toward a facilities management system or even a service bureau offering similar to the on-site minis offered by many processing services firms.

One indication that the Hydra may have long run significance is the formation of Spartacus Computers founded by George McQuilken, former Hydra project development leader. Spartacus intends to get into the Hydra compatible computer business with what it calls the "Kangaroo," or K102, with the idea being to let Hydra and VM type features run on a machine costing only $30,000, instead of the $200,000 levels of the 4341s.

But whatever the outcome, by providing more choices, IBM has further clouded its DDP strategy to users and its sales force alike.

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• DEC TO MAKE VT100s INTO DESKTOPS. There are more than 250,000 VT100s out there which for $2,400 can be upgraded into a personal computer running the CP/M operating system. Vendors of VT100-compatible terminals have their work cut out for them. Designated the VT18X, the upgraded machine will have a Z80, 64K and dual 5.25 in. floppies storing 160K. The CP/M software costs an additional $250. Lifeboat has already announced it will provide at least 100 packages and software support for the VT/100. The VT18X kit will be sold by DEC's terminal distributors, and can be ordered and serviced through DEC's Computer Stores. DEC says the VT100 was designed with these upgrades in mind with built-in extra power-handling capacity, accessory ports, and internal space. Pushing a single button will make the switch from VT100 functions to personal computer functions. Shipments of the VT18X kit start in January 1982.

• APPLE EXEC SAYS SOFTWARE PROTECTION HOPELESS. At the Northeast Computer Show in Boston, Apple President Mike Markkula said efforts to protect software content will fail and ultimately the price of software, like books, will be determined by the costs of packaging and distribution. Spokesmen from IBM, Atari, and Radio Shack disagreed.

• MAINFRAMERS HAVE ROUGH THIRD QUARTER. The figures show Honeywell earnings down 31%, NCR down 30%, Burroughs down 23%, and IBM down 22%. Only CDC reported a rise, with its computer business up 29%. With only 35% of its business coming from overseas, CDC was less hurt by the strong U.S. dollar and the recession overseas. Honeywell in particular was hurt in Europe where its CII Honeywell Bull is expected to report a loss this year.

• TANDEM TO HAVE NEW COMPETITOR. Watch for a November announcement from Stratus computer, a start-up boasting 32 bit architecture that will go head-to-head with Tandem in the non-stop computing marketplace. Stratus says its concept in redundant processing will give it both high throughput and the lowest service costs in the industry.

• TRILOGY HOLDS FIRST PRESS CONFERENCE. Gene Amdahl said his machine will be 50% faster than the competition by 1984. Redundancy and remote diagnostics will also be stressed. Manufacturing will take place in Ireland, and the company has made an agreement with CII Honeywell-Bull by which Trilogy will supply certain semiconductor devices. CII agrees not to resell the parts to anyone except Honeywell, and Trilogy will get a 7% royalty on such sales. CII also has the rights to acquire "certain technology, knowhow, and patent rights."

• HONEYWELL IMPORTS DPS 7 FROM FRANCE that incorporate current mode logic, a technology that never made it in an HIS product here. The 7 series provide twice the performance of the Level 64/DPS systems; prices range from $279,877 to $920,382.

• CONVERGENT GRABS CONTRACTS. EDP/IR estimates Convergent has bagged contracts for its multifunction workstations that could be worth about $450 million over the next four or five years. Among the customers are NCR, Burroughs, Savin and Thomson-CSF, all of which have procured manufacturing rights. Also, Rolm intends to incorporate Convergent techniques in its products. Convergent is adding a 73,000 sq ft plant. Burroughs' Jerome Jacobson is on the board, but Burroughs doesn't own a piece of Convergent.

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EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"The Gray Sheet"

MOLLY UPTON, EDITOR OCTOBER 21, 1981 ● VOL.17,NO.12 P.J. MCGOVERN, PUBLISHER

IBM REACHES OUT TO INDEPENDENT SOFTWARE VENDORS, ENDORSES SOFTWARE PUBLISHING CONCEPT

Over the years relations between IBM and third party software houses have often been cool at best. But lately the giant has thrown a few of its logs into the fire and invited the independents to sit down and chat.

The new chumminess has its angle; the giant needs software, always has. But because proven available software has now become a key system selling point -- from mainframes to desktops -- IBM has rethought its priorities, and will now take third party software and use it for what it is -- an essential part of its hardware marketing edge.

The tone was set when the personal computer was announced. Microsoft, Peachtree, and Personal Software were all asked to help out, and the giant announced plans to get into the software publishing business, promising to review programs from any and all sources.

That spirit seems to be rubbing off on the larger systems as well. Both DPD and GSD have made overtures to the independents, expanding their long-standing Installed User Program (IUP) policies. Among the highlights:

- GSD is inviting both industry-specific and cross-industry packages. Would-be providers merely need to submit applications programs directly to IBM. Expected beneficiaries are the System/23, S/34, S/38, and Series 1. (GSD has used third party software in the past, but only through the recommendation of the IBM sales staff.)

- DPD is throwing a party for some 100 independent software vendors. Called the Applications Software Development Conference, the soiree will take place October 26-28 in White Plains. Discussions are expected to focus on the 4300, 8100, Series 1, and personal computer. System software vendors are also being invited.

IBM's moves follow similar announcements by Data General, Digital Equipment, Texas Instruments, and Apple, each of whom is trying to strengthen ties with its third party supporters. Indeed, it looks like the idea of the software publisher has begun to take shape, although in this case the publishers will only be selling the in-house label.

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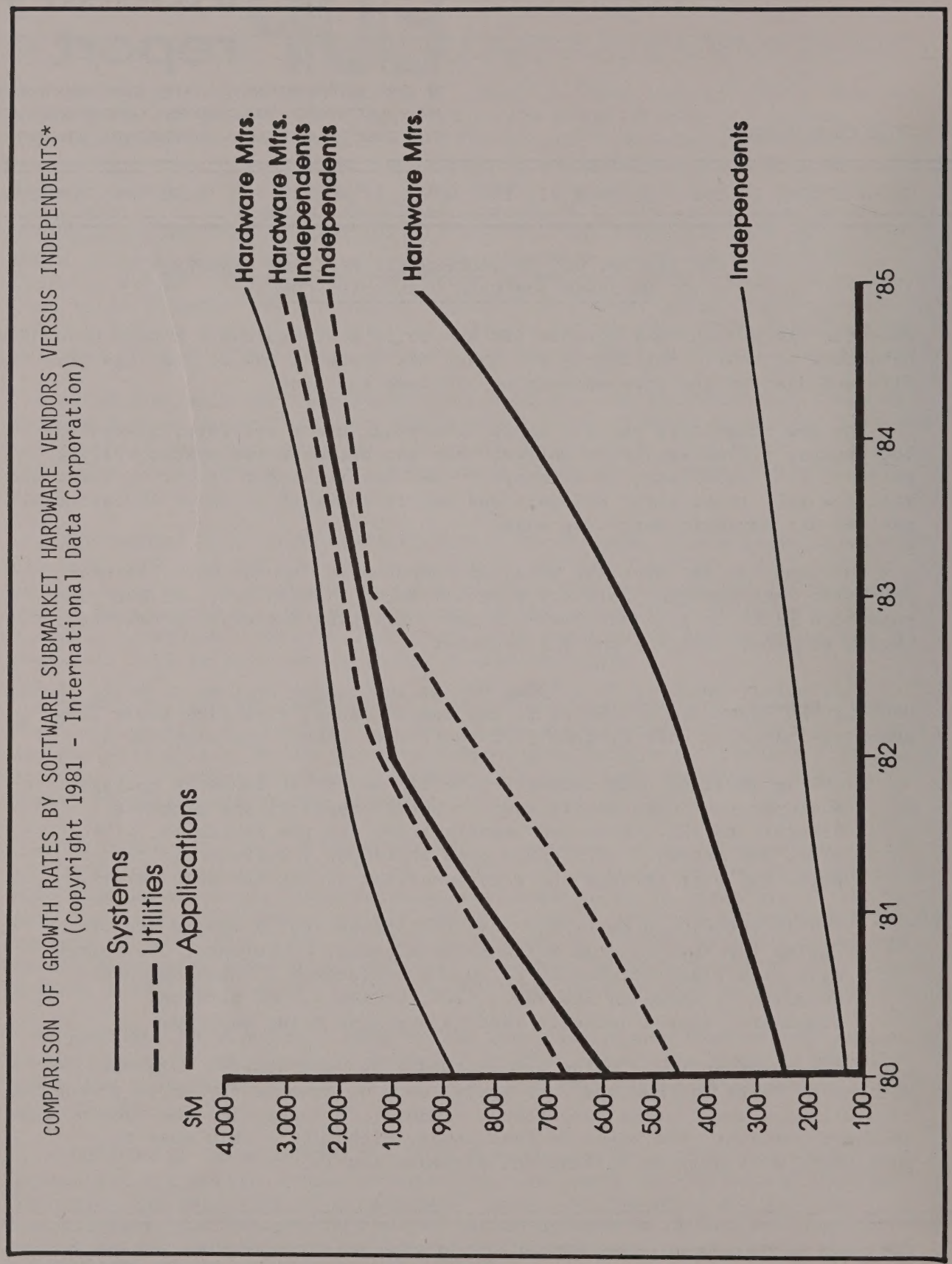

*Forecast does not include effects of any joint marketing endeavors.

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True independent software publishers are found only in the desktop realm where companies like Personal Software, Lifeboat and others are serving an increasing share of the market. These companies are rapidly becoming the main outlets for the literally thousands of programmers now working out their own creations, like would-be novelists trying to find their place in the sun.

GSD gets into publishing business

Having the IBM sales force selling your software must be the dream of many an independent. Reaching the IBM customer base and finding the resources for a strong sales pitch have always been stumbling blocks for a myriad of thinly capitalized independent software firms.

At the same time, what there is of IBM application software is often held in less than the highest regard, usually requiring additional modification. Historically, IBM hasn't shown much interest in taking a strong position in the application software business; the market is too specialized, requiring detailed knowledge of individual markets as well as deft timing and niche targeting. It is an area where even the giant can't be all things to all people. But with software revenues on the rise, IBM wants in on the action.

GSD has marketed independent packages for some time, but only through the requests of its own sales force. By establishing a formal publishing relationship, IBM is encouraging independents to target IBM equipment; if the product is good then IBM can sell it; if IBM can't sell it, who can? Since sales of small systems are often made directly to end users, proven software is necessary. Additionally, many of these new buyers don't feel comfortable buying from a systems house they've never heard of, and will surely find IBM's software stamp of approval comforting.

The non-exclusive marketing arrangement will apply to applications where IBM does not have a product, and can include industry-specific and cross-industry packages, as well as conversion and productivity aids. The programs may operate alone or in conjunction with IBM programs. Program owners will receive a royalty and will be responsible for maintenance. Other criteria include:

- The program must be operating in multiple GSD locations.
- The program is transferable and maintainable.
- The submitter can supply support directly to licensed users.
- The submitter has complete ownership of the program.
- The program is submitted to IBM on a non-confidential basis.

DPD needs help too

Sophisticated users have long been a source of some of the best software in the DP industry. A prime example is Cullinane's IDMS, originally developed by B.F. Goodrich. McAuto and Informatics, among others, have also obtained rights to user-developed packages.

In recognition of this, IBM has for many years had its Installed User Program (IUP) policy. It has been a low key mechanism for packaging and marketing user-developed products, with the impetus usually coming from IBM field reps, not the developer. Unsolicited submissions have not been accepted largely to avoid a possible deluge. After IBM headquarters certifies the software, a royalty agreement is struck with the developer.

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Recently, IBM has extended the IUP program to independent software developers, and its recent overtures toward major third party software vendors should be seen in this light. Whether IBM plans to set up some sort of royalty rights or whether it will pay a flat fee for marketing rights remains to be seen. Some say it's the most important software move since the great unbundling of 1969, and, ultimately, it seems likely that a system similar to GSD's endorsement plan may evolve for DPD products as well.

Other vendors take similar tack

IBM isn't the only one that realizes it could use some help in the applications software end of the business. Both mini and micro firms have felt the same needs and are opting for similar solutions, usually insisting on proven installations, documentation, and maintenance. The following programs have been announced over the last few weeks.

- Data General's Independent Software Vendor (ISV) program is recruiting application software for its Eclipse line, either in a software or turnkey format. The move is aimed primarily at attracting large software houses who do not currently write for DG, but DG will also produce a list of approved packages consisting of submitted software that meets DG criteria.

- DEC's Comprehensive Application Program (CAP) will be its first attempt to sell third party packages under the DEC name; it will also produce a list of DEC approved software, accepting full service and support responsibilities. CAP will oversee DEC's previously announced External Applications Software Library.

- Intel's Software Distribution Operation will market third party software for the 8086, 8088, and 8080. In most cases, the products will be sold as if standard Intel offerings, except that the original developer will be noted somewhere in the fine print. Unlike the others, Intel is concentrating mainly on languages and operating systems, not applications.

- Texas Instruments' Industry Applications Specialists (IAS) program is meant to beef up the software for its 990 desktop, particularly through vertical market packages. Both TI and the IAS can market the software, with the IAS handling all training, service, etc.

- Apple is concentrating on finding new developers and on convincing established firms to write for it. In addition to getting new software, Apple must find a way of protecting its users from the growing amount of bad software found among the some 15,000 titles available for the Apple II. Apple sees itself playing a major role in the software quality control area.

Desktop and mini vendors have always spent a lot of time and energy signing up dealers and system houses to move their hardware, and now this competition for third party help has definitely spread to software. A few key software "editors" can review a lot more programs than they can produce, and thus a small firm can bring software products online relatively quickly. The analogy to book publishing is clear; the only difference is that these editors deal in code not sentences.

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DESKTOPS STAY IN HEADLINES ... IBM MACHINE LOOKS LIKE A WINNER

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With the exception of Burroughs, NCR, and CDC, all the DP leaders have aggressively brought desktop systems to the market. (Burroughs may make a late entry through Convergent Technologies, and CDC has its Plato system and ties to Ohio Scientific.) Noting the heavy word processing use on Apple and Tandy machines, vendors such as Honeywell, Xerox, and DEC have taken a WP tack. But although WP is still a prerequisite, other trends are starting to emerge:

- OEMs. Systems houses, distributors, and other value-added suppliers are quickly preparing themselves for the desktop boom, as are traditional OEM suppliers like DG and DEC. Japanese desktop vendors will also concentrate on this route in the short term. Systems houses are increasing their desktop software development efforts.

- Communications. 3270 is becoming standard, and those who don't offer it now probably will. In addition, file compatibility with the vendor's larger machines is also becoming an asset.

- Standard processing chips. Only DEC and Honeywell use their own logic chips. Wang, Xerox, and HP went to Zilog; IBM is firmly in the Intel camp with all three of its desktop products, a tie with considerable long term ramifications.

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- Graphics. IBM has set the pace by imbedding a graphics board in even its thinnest personal computer system. North Star claims the first bit-mapped graphics package on its Z80-based Advantage series.

Yet to catch on are hard disks, shared systems, and 16-bit architecture. Presently, floppy-based systems have dominated, but recently Tandy has come out with a 8.5Mbyte hard disk that can be shared by two users and DEC offers a 12" disk on the Decmate. As desktops get more powerful, the need for more storage for things like mailing lists will become apparent. EDP/IR expects hard disk systems to emerge over the next few years as price/performance improves. As for 16-bit systems, they will be needed when the size of CPU memory increases since the biggest advantage to 16-bit chips is in their large address space, not their marginally improved processing speeds.

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	IBM Personal	IBM Display-Writer	IBM Datamaster	Honeywell Infowriter	Hewlett Packard 125	DEC Decmate	Xerox 820	Wang Wangwriter
CPU Compatible Files	370s, etc.	370s, etc.	34	DPS & Level 6	HP 3000	Decword	Via Ethernet	No
Price (Std. conf.)	$5,055	$12,520	$12,530	$8,395	$10,865	$9,595	$5,895	$6,400
HW Maintenance/Yr.	$ 555	$ 1,800	$ 1,380	$1,000	$ 576	$1,300	$ 780	$ 900
SW Maintenance/Yr.	Dealers	Bundled	2 yr. warr.	Bundled	$ 900	Bundled	Bundled	Bundled
Daisywheel (cps)	No	40	40	35	35	45	40	20
Memory Kbytes (Min.-Max.)	16-256	160-256	32-128	128	64	32-96	64	96
3270 Emulation	Intends	Yes	No	Yes	No	Yes	Yes	Yes
RS-232 Ports	Yes	Yes	No	Yes	Yes	Yes	Yes	No
CP/M	Yes	Yes	No	Yes	No	Yes	Yes	
Main Language	Basic	Basic	Basic 34	GCOS	Basic	Basic Fortran	Basic Cobol	Basic
Visicalc	Yes	No	No	Yes	Yes	Yes	Yes	No
Graphics	Yes	No	No	No	Yes	Yes	No	No
Volume Discount	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Disk Capacity	320K		2.2M	1.2M	.5-2.4MB	1-2MB	92K-250K	640K
Disk Type	5 1/4"	5 1/4"	5 1/4"	5 1/4"	5 1/4" or 8"	8" or 12"	5 1/4" or 8"	5 1/4"
Date Available	10/81	6/80	7/81	12/81	9/81	8/81	6/81	12/80
CPU	8088	8086	8085	DPS6	Twin Z80-A	6120	Z-80	Z-80

NOTES - Displaywriter is fully configured with 256K needed for records management. System/23 with 128K. System/23 and personal computer have matrix printers, all others are daisy wheels. Xerox 820 can have 3270 emulation through $15,000 871 server. Displaywriter's CP/M from Digital Research.

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One of the personal computer's chief rivals in IBM environments may turn out to be its own Displaywriter. Although ostensibly geared to word processing tasks, DP enhancements continue to come along. Digital Research has put CP/M aboard the system's 8086, IBM has added 3270 communications under SNA, and United American Service Company has added a bank package that enables the Displaywriter to act as a remote terminal via 2260 or 3270.

Software publisher deluge

Just as major publishers receive thousands of unsolicited manuscripts each year, software publishers are being asked dig out from underneath piles of submitted computer programs; separating the wheat from the chaff isn't easy.

A spokesman for Personal Software, publisher of Visicalc, reports that it receives more than a dozen programs a day covering everything from operating systems to operating rooms. 99% of the effort is destined for rejection.

The company is refocusing its business. It is dropping its games/entertainment line, because it doesn't have the resources to deal with both the business and entertainment markets. Personal Software began with Microchess.

In serving the business market, it has also decided to focus on generic packages like Visicalc, as opposed to application-specific functions. Generic programs can be sold in much larger quantities, enabling the company to both economically rewrite the program for use on different vendor hardware, and to spend the time necessary to bring the program up to reliability and documentation standards. Ideally, the rise of software publishers will make buying microcomputer software less of a caveat emptor affair.

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• SEARS BUYS DEAN WITTER, EDGES CLOSER TO DP. With a stated goal of becoming "the largest financial services entity," Sears plunked down $607 million for Dean Witter, the nation's fifth largest securities firm. Just four days earlier it picked up Coldwell, Banker, & Co., the nation's largest real estate broker. On September 1, it asked SEC permission to establish a money market fund. The nation's largest retailer (1980 sales $25.1 billion) now has a combination of real estate, insurance, banking, and retail services rivaled only by American Express. It also has a credit card base of some 80 million cards, more than Visa or Mastercard. EDP/IR believes that there is at least one more acquisition to fall, a DP service firm with a heavy emphasis on both communications and transaction processing. Such a move would complete its positioning for both teleshopping (it already has its catalogue on video disk), home banking (linked to a money market), and possibly an automatic teller machine network (using the Sears card). With its existing pieces, Sear's could relocate you, insure you, finance your mortgage, and open your financial account.

Sears has also opened the first two of its new business centers October 7 in the Chicago suburbs. Included are small computers, copiers, software, typewriters, printers, and the appropriate supplies. The hardware includes products by IBM, NEC, Exxon, HP, Hitachi, Olivetti, Panasonic, TI, and Saxon. Sears will supply credit, finance, and service support. Other scheduled test sites include Dallas and Boston.

• NDC TAKES IN RAPIDATA. Atlanta-based National Data Corp. is the type of firm Sears might want to look at. With fiscal 1981 revenues of $75 million the company has strong positions in cash management, transaction processing, direct response TV sales, and nationwide communications. In September, NDC aquired Rapidata, a $21 million service firm with a problem solving background in finance, banking, corporate cash management, and scientific areas. The move should give NDC more sophisticated tools, and help Rapidata make a smoother transition away from its scientific/engineering roots.

• MICRODATA, FOUR PHASE MAKE SPLASH AT INFO '81. One of the few major announcements at the N.Y.C. show was Microdata's entrance into the 32-bit mini market. Though the architecture is different, Microdata says the application software is compatible with the Reality series. Called Sequel, a system configured with 4 CRTs, 1MB main memory (2MB is available), 256 MB disk storage, 1 tape drive, and a 300 line/minute printer sells for $155,000.

Four Phase used the show to announce that it is using its acquired Two Pi 4300 compatible machines to build distributed systems for the office. Called the COMS/IV Corporate Office Management System, the system uses a relational database and telecommunications software monitor developed by Applied Data Research. Each IBM compatible processor, called the 311 and 312, can support up to eight Four Phase IV minicomputers. The COMS/IV system will handle electronic mail, document management, and executive services, in addition to batch processing tasks. It supports SNA, SDLC, bisynch, and asynch.

• BURROUGHS UNWRAPS 3950 REPLACEMENT. Burroughs' never delivered 4341 response is being replaced by the 3955, 1/2 the physical size of the design flawed 3950, and using 25% less power. With main memory in the 2MB to 5MB range, prices start at $290,000. Volume shipments will begin this quarter.

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EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"The Gray Sheet"

MOLLY UPTON, EDITOR OCTOBER 21, 1981 • VOL.17,NO.12 P.J. MCGOVERN, PUBLISHER

IBM REACHES OUT TO INDEPENDENT SOFTWARE VENDORS, ENDORSES SOFTWARE PUBLISHING CONCEPT

Over the years relations between IBM and third party software houses have often been cool at best. But lately the giant has thrown a few of its logs into the fire and invited the independents to sit down and chat.

The new chumminess has its angle; the giant needs software, always has. But because proven available software has now become a key system selling point -- from mainframes to desktops -- IBM has rethought its priorities, and will now take third party software and use it for what it is -- an essential part of its hardware marketing edge.

The tone was set when the personal computer was announced. Microsoft, Peachtree, and Personal Software were all asked to help out, and the giant announced plans to get into the software publishing business, promising to review programs from any and all sources.

That spirit seems to be rubbing off on the larger systems as well. Both DPD and GSD have made overtures to the independents, expanding their long-standing Installed User Program (IUP) policies. Among the highlights:

- GSD is inviting both industry-specific and cross-industry packages. Would-be providers merely need to submit applications programs directly to IBM. Expected beneficiaries are the System/23, S/34, S/38, and Series 1. (GSD has used third party software in the past, but only through the recommendation of the IBM sales staff.)

- DPD is throwing a party for some 100 independent software vendors. Called the Applications Software Development Conference, the soiree will take place October 26-28 in White Plains. Discussions are expected to focus on the 4300, 8100, Series 1, and personal computer. System software vendors are also being invited.

IBM's moves follow similar announcements by Data General, Digital Equipment, Texas Instruments, and Apple, each of whom is trying to strengthen ties with its third party supporters. Indeed, it looks like the idea of the software publisher has begun to take shape, although in this case the publishers will only be selling the in-house label.

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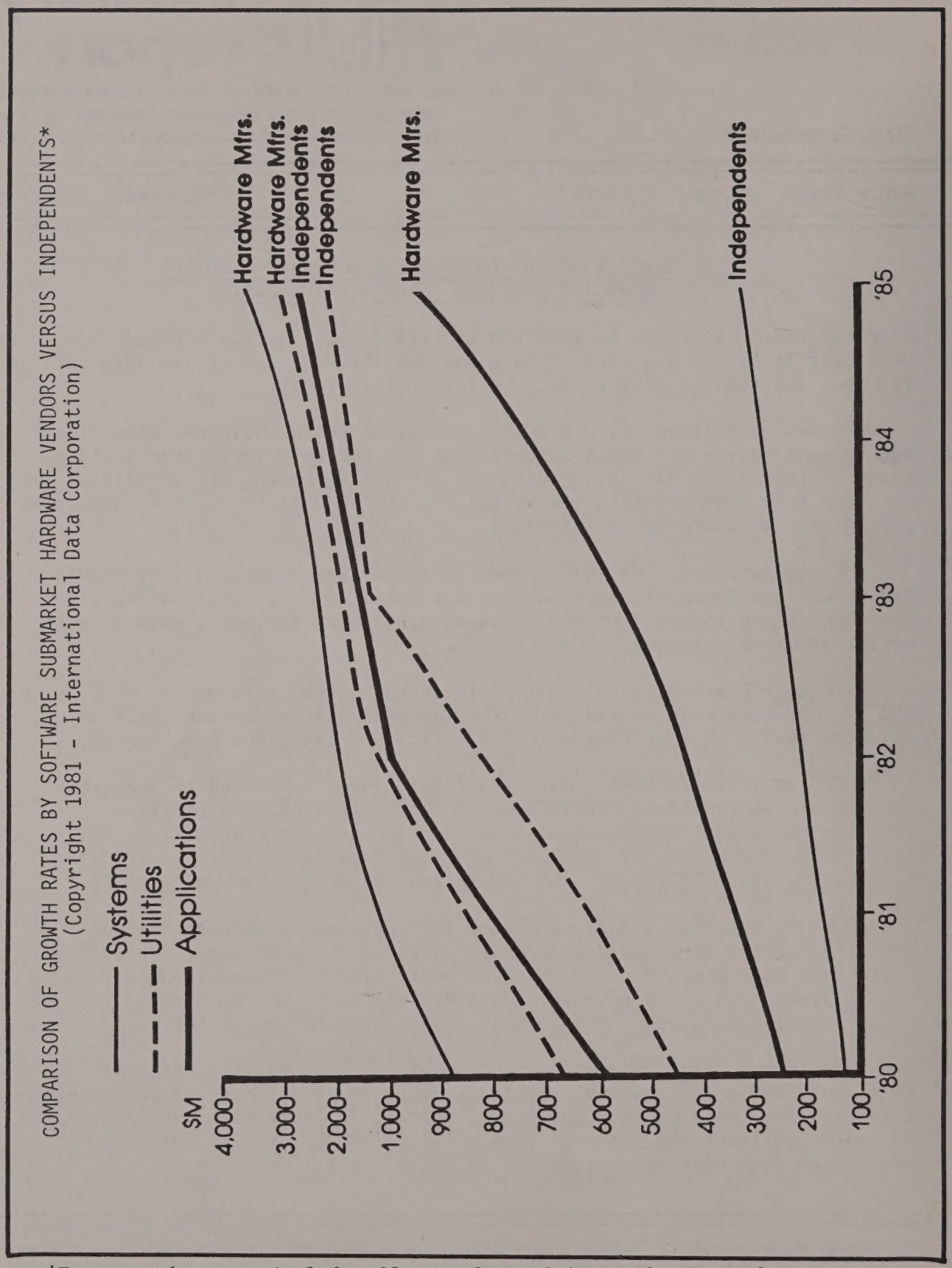

*Forecast does not include effects of any joint marketing endeavors.

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True independent software publishers are found only in the desktop realm where companies like Personal Software, Lifeboat and others are serving an increasing share of the market. These companies are rapidly becoming the main outlets for the literally thousands of programmers now working out their own creations, like would-be novelists trying to find their place in the sun.

GSD gets into publishing business

Having the IBM sales force selling your software must be the dream of many an independent. Reaching the IBM customer base and finding the resources for a strong sales pitch have always been stumbling blocks for a myriad of thinly capitalized independent software firms.

At the same time, what there is of IBM application software is often held in less than the highest regard, usually requiring additional modification. Historically, IBM hasn't shown much interest in taking a strong position in the application software business; the market is too specialized, requiring detailed knowledge of individual markets as well as deft timing and niche targeting. It is an area where even the giant can't be all things to all people. But with software revenues on the rise, IBM wants in on the action.

GSD has marketed independent packages for some time, but only through the requests of its own sales force. By establishing a formal publishing relationship, IBM is encouraging independents to target IBM equipment; if the product is good then IBM can sell it; if IBM can't sell it, who can? Since sales of small systems are often made directly to end users, proven software is necessary. Additionally, many of these new buyers don't feel comfortable buying from a systems house they've never heard of, and will surely find IBM's software stamp of approval comforting.

The non-exclusive marketing arrangement will apply to applications where IBM does not have a product, and can include industry-specific and cross-industry packages, as well as conversion and productivity aids. The programs may operate alone or in conjunction with IBM programs. Program owners will receive a royalty and will be responsible for maintenance. Other criteria include:

- The program must be operating in multiple GSD locations.
- The program is transferable and maintainable.
- The submitter can supply support directly to licensed users.
- The submitter has complete ownership of the program.
- The program is submitted to IBM on a non-confidential basis.

DPD needs help too

Sophisticated users have long been a source of some of the best software in the DP industry. A prime example is Cullinane's IDMS, originally developed by B.F. Goodrich. McAuto and Informatics, among others, have also obtained rights to user-developed packages.

In recognition of this, IBM has for many years had its Installed User Program (IUP) policy. It has been a low key mechanism for packaging and marketing user-developed products, with the impetus usually coming from IBM field reps, not the developer. Unsolicited submissions have not been accepted largely to avoid a possible deluge. After IBM headquarters certifies the software, a royalty agreement is struck with the developer.

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Recently, IBM has extended the IUP program to independent software developers, and its recent overtures toward major third party software vendors should be seen in this light. Whether IBM plans to set up some sort of royalty rights or whether it will pay a flat fee for marketing rights remains to be seen. Some say it's the most important software move since the great unbundling of 1969, and, ultimately, it seems likely that a system similar to GSD's endorsement plan may evolve for DPD products as well.

Other vendors take similar tack

IBM isn't the only one that realizes it could use some help in the applications software end of the business. Both mini and micro firms have felt the same needs and are opting for similar solutions, usually insisting on proven installations, documentation, and maintenance. The following programs have been announced over the last few weeks.

- Data General's Independent Software Vendor (ISV) program is recruiting application software for its Eclipse line, either in a software or turnkey format. The move is aimed primarily at attracting large software houses who do not currently write for DG, but DG will also produce a list of approved packages consisting of submitted software that meets DG criteria.

- DEC's Comprehensive Application Program (CAP) will be its first attempt to sell third party packages under the DEC name; it will also produce a list of DEC approved software, accepting full service and support responsibilities. CAP will oversee DEC's previously announced External Applications Software Library.

- Intel's Software Distribution Operation will market third party software for the 8086, 8088, and 8080. In most cases, the products will be sold as if standard Intel offerings, except that the original developer will be noted somewhere in the fine print. Unlike the others, Intel is concentrating mainly on languages and operating systems, not applications.

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• SEARS BUYS DEAN WITTER, EDGES CLOSER TO DP. With a stated goal of becoming "the largest financial services entity," Sears plunked down $607 million for Dean Witter, the nation's fifth largest securities firm. Just four days earlier it picked up Coldwell, Banker, & Co., the nation's largest real estate broker. On September 1, it asked SEC permission to establish a money market fund. The nation's largest retailer (1980 sales $25.1 billion) now has a combination of real estate, insurance, banking, and retail services rivaled only by American Express. It also has a credit card base of some 80 million cards, more than Visa or Mastercard. EDP/IR believes that there is at least one more acquisition to fall, a DP service firm with a heavy emphasis on both communications and transaction processing. Such a move would complete its positioning for both teleshopping (it already has its catalogue on video disk), home banking (linked to a money market), and possibly an automatic teller machine network (using the Sears card). With its existing pieces, Sear's could relocate you, insure you, finance your mortgage, and open your financial account.

Sears has also opened the first two of its new business centers October 7 in the Chicago suburbs. Included are small computers, copiers, software, typewriters, printers, and the appropriate supplies. The hardware includes products by IBM, NEC, Exxon, HP, Hitachi, Olivetti, Panasonic, TI, and Saxon. Sears will supply credit, finance, and service support. Other scheduled test sites include Dallas and Boston.

• NDC TAKES IN RAPIDATA. Atlanta-based National Data Corp. is the type of firm Sears might want to look at. With fiscal 1981 revenues of $75 million the company has strong positions in cash management, transaction processing, direct response TV sales, and nationwide communications. In September, NDC aquired Rapidata, a $21 million service firm with a problem solving background in finance, banking, corporate cash management, and scientific areas. The move should give NDC more sophisticated tools, and help Rapidata make a smoother transition away from its scientific/engineering roots.

• MICRODATA, FOUR PHASE MAKE SPLASH AT INFO '81. One of the few major announcements at the N.Y.C. show was Microdata's entrance into the 32-bit mini market. Though the architecture is different, Microdata says the application software is compatible with the Reality series. Called Sequel, a system configured with 4 CRTs, 1MB main memory (2MB is available), 256 MB disk storage, 1 tape drive, and a 300 line/minute printer sells for $155,000.

Four Phase used the show to announce that it is using its acquired Two Pi 4300 compatible machines to build distributed systems for the office. Called the COMS/IV Corporate Office Management System, the system uses a relational database and telecommunications software monitor developed by Applied Data Research. Each IBM compatible processor, called the 311 and 312, can support up to eight Four Phase IV minicomputers. The COMS/IV system will handle electronic mail, document management, and executive services, in addition to batch processing tasks. It supports SNA, SDLC, bisynch, and asynch.

• BURROUGHS UNWRAPS 3950 REPLACEMENT. Burroughs' never delivered 4341 response is being replaced by the 3955, 1/2 the physical size of the design flawed 3950, and using 25% less power. With main memory in the 2MB to 5MB range, prices start at $290,000. Volume shipments will begin this quarter.

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EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"The Gray Sheet"

MOLLY UPTON, EDITOR OCTOBER 7, 1981 ● VOL.17,NO.11 P.J. MCGOVERN,PUBLISHER

SBS, others eye local loops - page 5

IBM UNIFIES MARKETING APPROACH; ANNOUNCES 3380/3350 DELIVERY SCHEME

In a span of only 24 hours, IBM announced two major moves; it reorganized its sales, manufacturing and development groups, and it flatly stated that the problems with its large 3380 disk "have been corrected."

GSD, DPD, and OPD will be merged. For the first time since the General Systems Division was formed in 1974 IBM will, theoretically, be able to present a single marketing face to the customer, assuaging a serious problem in its sales approach to large organizations. As for the 3380s, IBM had promised a statement of direction by the end of September, and waited to the last day before saying all was well. Highlights of the two announcements are:

- All marketing and service divisions will be part of a new Information Systems Group, while development and manufacturing divisions have been reorganized into two groups -- one for large systems and one for small. In early 1982, the marketing group will be broken into two divisions; one in Atlanta and one in White Plains.

- By performing its own house cleaning, IBM has all but said that it does not expect to be hurt by any decision in the 12-year old antitrust suit, now expected by early next year.

- 3380 shipments will begin October 21, with delivery schedules some 14 months after the original assigned dates. Thus, a customer who had a June 1981 scheduled delivery, would now be assigned an August, 1982 date. New schedules for the 3350 have also been announced, with delays of from two to six months.

It is here that the simplicity ends, as both moves seem to raise more questions than they answer. IBM has announced that each of the two marketing groups -- one in White Plains, one in Atlanta -- will push the full line of IBM products ... from 3081s through Selectrics, but it has not said how the customer base will be segmented. With the 3380, it has announced a complicated voluntary swap plan, encouraging users to give up 3350 deliveries, in exchange for improved 3380 dates.

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CURRENT IBM U.S. ORGANIZATION

Vice President Group Executive Information Systems Group C. B. Rogers, Jr.	Vice President Group Executive Information Systems & Technology A. G. Anderson	Vice President Group Executive Information Systems & Communications J. F. Akers
• Data Processing Division	• Data Systems Division (Large Systems)	• Communication Products Division (Terminals, Front End Processors)
• Office Products Division	• General Products Division (Storage Products, Nonimpact Printer)	• Information Products Division (Office Products)
• General Systems Division	• General Technology Division (Semiconductors)	• Systems Products Division (Small Systems)
• Field Engineering Division • Federal Systems Division • Customer Service Division • Information Records Division		

PREVIOUS IBM U.S. ORGANIZATION

Vice President Group Executive DP Marketing Group J. F. Akers	Vice President Group Executive DP Product Group A. G. Anderson	Vice President Group Executive General Business Group C. B. Rogers, Jr.
• Data Processing Division	• Data Systems Division	• General Business Group/International Division
• Federal Systems Division	• General Products Division	• General Systems Division
• Field Engineering Division	• System Communications Division	• Information Records Division
	• Systems Products Division	• Office Products Division
	• General Technology Division	• Information Systems Division

Why restructure now

Not surprisingly, IBM's official reasons for the reorganization are vague. On the sales side, the move will fulfill IBM's "objective to offer the broad array of IBM's products through individual marketing groups." On the development and manufacturing side, CEO John R. Opel has said, "The restructuring of our manufacturing and development divisions into two groups will put similar or related products under common management. This will allow us to take greater advantage of rapid changes in technology and to coordinate long-range product plans more effectively."

Of the two, the sales reorganization seems the more urgent. Interdivisional rivalries and lack of communication within IBM have long worked to the company's disadvantage with some accounts. Confusion between products -- such as the Series 1 and the 8100 -- and incompatibility between others -- especially in the office -- have made users' decisions more difficult than necessary, and too often have made the "IBM solution" relative to the division asked. As communications and compatibility have become increasingly important this problem has worsened, in marketing and product development alike.

The key question that remains is just how marketing responsibilities will be divided and why IBM has not announced them. EDP/IR believes the most likely breakdown will be either by size of company, or by whether the company has an IBM mainframe or not. Geographic or industry breakdowns would throw too many existing accounts topsy-turvy.

Whether any move will totally clarify IBM's product line remains to be seen. Even within IBM opinions concerning the hardware solution to any one need will differ, and salesmen used to pitching one product may find it difficult to switch to another. Nevertheless, the appearance of a single IBM product line, possibly coupled to some type of team sales approach, should make potential customers more comfortable, especially if the development people succeed in producing more coherent product families.

On the manufacturing side

IBM's segmentation of manufacturing operation raises some interesting questions about the development of future systems. As the chart on page 2 indicates, everything except for large systems, non-impact printers, storage products, and semiconductors will fall under the Information Systems and Communications Group.

IBM has decided to split the 4300 series down the middle. The 4341 series will go to the large system division, the 4331s to the small. The two machines are architecturally different, and only the 4341 group can support MVS. One interpretation of this decision suggests that by getting the 4331 away from the large system domain, IBM is preparing the world for the new architecture that many expect to be announced for the 3081. If this is the stratgey, MVS is surely the chosen path.

It is well known that over the last few years IBM has been plowing a lot of money into new manufacturing facilities. By dividing its manufacturing into large and small machines, IBM may be saying something about how it sees the market shaping up for the next five to ten years, and perhaps realizing that it can't keep its traditional price umbrella over its entire product line.

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This line of reasoning argues that in the small system area, IBM is gearing up for a mass manufacturing approach, designed to give it the lowest cost possible. Given the strong U.S. and Japanese competition, low cost manufacturing will be the key to success in the desktop and office automation environments -- consider the Displaywriter, the Datamaster, and the new Personal Computer. Supporting this is the recent decison to allow seven independent distributors to sell 3101 terminals and Model 51 printers.

On the large systems, where customers are less likely to stray, IBM may feel it can preserve its traditional price umbrella. An offshoot of this reasoning would be that in the long run IBM may sell small systems through independent, retail-like channels, with the IBM sales force concentrating on the higher ticket products.

Implications for antitrust

Perhaps the clearest theme that comes through all these moves is that IBM must believe that it need not fear the Justice department's 12 year antitrust suit. If it feared government imposed re-organization, it would not be smart to start its own revamping.

The case, which is considered an Albatross by many in Justice, winds on. The formal trial ended last June, and both parties are awaiting the post trial proceeding scheduled to begin December 1. Those hearings, which should last about 90 days, should determine the final outcome. In the interim new Attorney General, Willaim Baxter has been getting briefed on the case; he has also been meeting with IBM counsel; a recent meeting took place on September 26. Not surprisingly, Baxter's staff is giving "no comments" to all questions.

Want a 3380? Have we got deal for you

If IBM had its druthers, it would probably never make another 3350. Unfortunately, because 3380 shipments have been delayed so long, it has a large number of orders for 3350s. Many of these orders are by customers who also have 3380s on order. IBM seems to believe that a lot of these customers don't really want both, and thus it is giving its users an incentive to reveal their true preferences now, so that IBM can have a better sense of what its production runs should be.

IBM is offering a one for one swap in terms of storage capacity. Customers willing to defer four 3350 drives will be promised a 3380 before September of 1982; participating users must notify IBM by October 21. Given IBM's track record of delivering storage products on time, user reluctance to give up a working product is understandable, especially since the faster 3Mbyte channels needed to use 3380s on the 3033's have not really been tested in the marketplace. Many large users, desperate for storage, may not want to gamble on IBM, despite assurances that the problem "has been corrected."

Suspicions persist that, despite what IBM says, manufacturing problems may still arise. But if IBM wasn't confident of its deliveries, why would it encourage people to make the shift to 3380s ahead of their original dates. Given the possibly irreparable bad will if IBM renigs on this deal, EDP/IR is in- clined to take the giant at its word. As for 3350s, they will probably remain in short supply; following the announcement residual values for 3350s went back up to well over 100%, compared to the previous 85%-95%.

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SBS, TYMNET, AND OTHERS STAKE CLAIMS TO BELL TERRITORY AS VENDORS RUSH TO FILL DIGITAL TRANSMISSION VOID

In her darker moments, Ma Bell must see threats to its regulated communications hegemony coming from all sides. Once consisting of mere gnats like MCI and SPCC, far more formidable adversaries now await, taking aim on long and short haul traffic alike.

It has only been five months since Xerox backed out of its highly publicized XTEN project, an envisioned long distance satellite facility coupled with local distribution via microwave radio that would have offered end-to-end high-speed digital transmission without using telephone company circuits. Thirty million dollars of R&D went down the drain, leaving Xerox with little to show except a closet full of studies and some rooftop lease options.

Despite this glum retreat, a host of other companies, both large and small have been eager to follow Xerox's footsteps. Satellite Business Systems, Tymnet, and Insurance Systems of America Communications (Isacomm) head a growing list of would-be providers of Digital Termination Systems (DTS) -- the bureaucratic term for radiowave-based local data distribution systems.

Today, only SBS offers a total non-Bell solution, but that package requires users to invest in their own earth stations. DTS systems will share vendor operated dishes and use microwave transmission to link individual users. By eliminating the need for local telephone loops, the companies hope to outdate the old data communications adage that "90% of the long-distance charge comes with the last mile."

AT&T has shown no signs of hopping on the DTS bandwagon. Why should she? As long as Long Lines remains a profit machine, Ma Bell will have little reason to undercut that service until competitors prove that there is a lucrative market in DTS. But if the Federal Communications Commission (FCC) gives its approval, such proof may not be long in coming. Among the plans:

- Both SBS and Tymnet have asked FCC permission to build wideband digital nets. Both claim the service would be much faster, less error prone, and considerably cheaper than comparable Bell services.

- SBS plans to follow MCI and SPCC into the long distance voice business, using AT&T only for local distribution.

- United Telecommunications has acquired Insurance Systems of America, owner of Isacomm, a resale common carrier primarily serving the insurance industry, which has also filed for DTS service approval.

Digital termination systems will have two inherent advantages over their wire-based competitors. Most importantly, they will be able to transmit data at up to 1.5Mbit/sec at costs competitive with today's 9.6Kbit/sec phone lines (assuming vendors price DTS services according to equipment and operational costs rather than the value of an equivalent AT&T service).

With relatively low capital requirements (about $40 million) and the shortage of DTS frequencies (the FCC sees room for nine vendors), intense competition for frequencies and rooftop locations should develop over the next three

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DTS PLAYERS AND STRATEGIES

• Isacomm. A resale common carrier and subsidiary of Insurance Systems of America (ISA) which pending approval will be owned by by United Telecommunications Corp. (UTC), a $2 billion holding company. Isacomm filed its DTS application July 1981 and plans service for 30 cities. UTC will provide needed financial backing for DTS as ISA is only a $22 million company. Isacomm is SBS's largest customer with six earth stations; its customers will be mostly mid-sized insurance companies; the large ones would go directly to SBS.

The fit with United Telecommunications is complicated. UTC is the parent company of three firms: United Telephone System, 73% of revenues; United Communications System (supplies), 20% of revenues; and United Information Systems (processing services, timesharing, remote batch, etc.). According to a UTC spokesman, UTC has not yet determined whether ISA will operate independently or become a part of an existing UTC operation.

United Telephone is the second largest independent telco in the U.S., ranking only behind GTE. But according to the spokesman, the phone company is not likely to be affected by ISA or Isacomm since most of its business is in Florida and North Carolina, areas not covered in Isacomm's plans.

United Information Systems is also heavily involved in the communications business. In March the company announced that its Uninet packet switched network would be made available to the public. Uninet has served UIS's customers since the late 1960s; it currently serves 165 U.S. cities. UTC says that Uninet and Isacomm may do business with one another, probably using Isacomm satellite circuits to cut down long distance charges for Uninet. Currently, all Uninet traffic flows over land lines.

• Tymnet. Revenues of about $30 million, serving 250 cities. Fully-owned subsidiary of Tymshare (1980 revenues $235 million). August DTS filing proposes serving 50 U.S. metropolitan areas with digital radio frequency transmissions at a maximum speed of 1.5Mbit/sec. Ten of these areas would be operational within a year after license with the other 40 coming over the following four years. Tymnet's biggest asset may be its recent acquisition of Microband, a large broadcaster of pay TV signals. Not only did this pickup give Tymnet needed expertise in microwave transmission, but it also gained choice rooftop leases. Microband holds 43 Multipoint Distribution Service (MDS) licenses in major markets. Given the reported success of its San Francisco experiment and its large customer base, about all Tymnet is lacking is a broadband satellite interconnect. According to Jerry Lucas, president of Telestrategies and an author of IDC's Telecom Insider newsletter, a partnership with American Satellite is likely.

• GTE/Telenet. Seems to be dragging its heels a bit, but is expected to file for DTS by the end of the year. The $65 million packet net has recently hired Bill Combs, former Xten Marketing VP to head up its DTS program. GTE has its own satellite facilities through GTE satellite, but is weak on rooftop locations, staffing, and near term satellite networking facilities.

• MCI and SPCC. Are both looking at alternatives to telco loops. MCI says it pays 20% of its revenues to AT&T for local connections, and if Bell gets her way this figure might rise to 50% by 1985. Without their own local connections it's hard to see how these firms can be competitive in the long run.

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to five years. This competition should force DTS prices down eventually to the operational cost level. Consequently, the service looms as potential boon to heavy communications users who can't justify their own earth stations, especially since customer DTS equipment can be set up in a matter of hours or days, compared to a typical 18 months for a rooftop full duplex earth station.

Customers would need only a two-foot diameter antenna and associated 10 gigahertz (GHz) terminal equipment, with line of sight aim at a central receiving node consisting of three antennas each covering a 120 degree service area and receiving signals from a four mile radius. This system permits the re-use of frequencies within the different cells in the same metropolitan area. To receive long distance traffic, SBS would operate an earth station in or near each, a configuration identical to that tested in the San Francisco experiment.

SBS filed its application on August 18. The document asks FCC permission to "construct digital termination systems in 32 metropolitan areas in the U.S." According to SBS spokesman Larry Weekley, the DTS will be able offer just about anything that the full blown SBS service can. The application was a follow up to the January 14 FCC order in which a portion of the 10 GHz radio band was set aside for end-to-end common carrier radio services called Digital Electronic Message Services (DEMS).

The company hopes to begin service in mid-1983, initially between Chicago, Dallas, Los Angeles, New York and Washington, D.C., with all 32 systems installed by the end of 1986.

Moving in on Bell

SBS currently plans to offer three services. The existing large user service is called Communications Network Service (CNS). Beginning early next year, the company will offer an Interstate Telephone Service (ITS).

The little publicized ITS service will put SBS into the same business as MCI and Southern Pacific Communications Corp. (SPCC). SBS will install some 20 earth station linked to the SBS satellite. These stations will handle long distance phone traffic. The calls will then be inserted into telephone company local loops for delivery to recipients; in time microwaves could displace even these local loops.

Given the size of the $25 billion long distance market and the heady success of MCI et al, SBS and others see an almost limitless potential to the inter-city voice market, especially with Bell still tied to a regulatory structure which causes it to overprice long distance connections to help subsidize local phone service. MCI revenues have doubled to $234 million over the last two years, and it now has plans to expand its market overseas. MCI claims its service is 40% cheaper than WATS while SBS claims an advantage of "at least 10-15%." SBS plans call for serving 150 metropolitan areas by 1983.

SBS update

As you read this, SBS's second satellite is being readied for service. Launched September 24, it is currently going through final positioning and testing, with service beginning early next year. SBS's first bird went up in November 1980, and the third is scheduled for a space shuttle flight late in 1982, although these schedules have had a history of delays.

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Initially these three birds will have more capacity than SBS customers can use. Thus, in order to help pay the bills, SBS is making short term, pre-emptible agreements with various, as yet unannounced, TV broadcasters. SBS spokesman Larry Weekley estimates that these leases will run through mid-1985.

According to Weekley, customer response has been just about right on schedule. Service has been available since March of this year and there are now three users -- IBM, Boeing, and Isacomm. The latter is now the largest customer with six earth stations installed; IBM has five.

The schedule calls for six more firms to go onstream before the end of the year; this second list includes: General Motors, Crocker National Bank, Wells Fargo Bank, Westinghouse, Allstate Insurance, and Travelers Insurance. Over the long term, SBS says that it has commitments from an additional 16 firms, bringing the total to 25 to be installed by the end of 1983.

SBS expects that most customers will initialy use either voice or data, migrating to the use of both over a year or two. Currently all three customers are using SBS for voice transmissions. As yet only Isacomm has decided to use the 70 pages/minute communicating copier developed for SBS by AM International; Isacomm leased four of them this past June.

Because SBS does not do its own manufacturing it has had to rely on a variety of hardware suppliers. Among the major components, the satellites come from Hughes Aircraft; the earth stations from NEC and Hughes; data switches from Northern Telecom; burst modems from Fujitsu; satellite communication controllers from IBM; port adapters from NEC, and central reference stations from Link-a-bit.

Since even the large users are showing a preference for voice over data, it seems likely that the the ITS may actually get priority over the DTS plans. Consider the management problems: full-scale SBS is just now getting operational; the phone service has yet to begin, and now comes DTS. The legal problems alone are mind boggling, and with only 1,400 employees, SBS may well have its hands full for the next three to five years.

Bell view

Although the FCC opened the telecommunications market to competition in 1968, until about 1978 only about 12% of Bell revenues were vulnerable, and competitors had only about 3% of the market. After the Execunet decision, some 50% of the revenue base became fair game, including long distance calling, equipment, building wiring, etc. Now the advent of DTS services, which compete with local exchanges, threatens to open up the final portion of the market.

Is Bell ready? 100 years of monoploy and regulation have given it a balance sheet quite different from her competitors. Long depreciation schedules show only about 20% of its asset base written off at any one time, compared to 50% for IBM and Xerox. The result is a lot of overvalued equipment, not easily moved aside to meet the force of competition. Estimates suggest this overvaluing could be as high as $50 billion. As long as services are based on these costs, there will be room for competitors, unsaddled by existing investments.

A comparison? Imagine Amdahl's success if regulators forced IBM to sell 3033s at the same price/performance level as it sold 360s.

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MOLLY UPTON, EDITOR SEPTEMBER 11, 1981 ● VOL.17,NO.9 P.J. MCGOVERN,PUBLISHER

National Semi drops out of bubble market

U.S. SEMI MAKERS HAVE WORST SEMESTER SINCE 1975; JAPANESE THREATEN IN 64K RAM MARKET

Declining earnings, layoffs, and divestiture of marginal lines are not terms normally associated with the dynamic U.S. semiconductor industry -- until recently that is.

Not since the recession of 1974-75 has the semiconductor industry had to endure such indignities, and although the red ink will not be as bad this time around, to some extent the trouble is more serious, since in this case many of the wounds have been self-inflicted.

Despite high interest rates, the economy is only partly to blame. Demand volumes are about the same as in 1980, but because of intense price competition in the both the memory and logic sides of the market, profits have been hard to realize. Already the pressure has forced many cutbacks, and more battling, especially from the Japanese, is sure to come. Among the key events:

- Intel's announcement of delays in the production of its 64K RAM further opens the door to at least six eager Japanese vendors, with only TI and Motorola ready to represent the U.S.

- Overcapacity especially in the 16K RAM market has dropped prices faster than expected to less than $1.25, compared to about $2.75 last year. Chip prices have historically fallen about 30% per year.

- Because bubble memory is not expected to replace either RAMs or floppies, National Semiconductor has followed Texas Instruments which followed Rockwell out of the bubble market. Intel says it is still committed and Motorola is making a play, but the market is virtually being handed to the Japanese.

Although the gloom is still looked at as a short-term phenomenon, there is little doubt that the MOS market is overcrowded. In the words of Intel spokesman Laurence Hootnick, "Everybody wanted to get into MOS, now they're in it; I hope they enjoy themselves." He went on to add that there is really no end in sight to the current price pressure.

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COMPARATIVE PERFORMANCE (FIRST SIX MONTHS 1981)
MAJOR U.S. SEMICONDUCTOR MAKERS

	$ Millions Rev. 6/81	$ Millions Rev. 6/80	%X	$ Millions Earnings 6/81	Millions $ Earnings 6/80	%X	Avg. Rev. Growth 77-80	Avg. Earn Growth 77-80
Advanced Micro Devices	70.9	70.6	.4%	1.6	6.8	-76%	53.7%	74.0%
Analog Devices	77.0	61.4	25.0%	2.5	4.2	-68%	39.0%	18.8%
Intel	385.8	418.9	-8.0%	11.8	49.0	-77%	44.6%	45.0%
Motorola	1,660.2	1,552.5	6.0%	93.7	90.4	4%	19.8%	20.2%
National Semi-conductor	522.5	515.1	0.1%	20.1	26.7	-25%	36.3%	72.4%
Texas Instruments	2,120.0	1,960.0	8.0%	44.7	105.5	-58%	25.9%	22.2%
TOTAL	4,836.4	4,5785	5.6%	174.4	282.8	-38%	26.1%	28.2%

N.B. - Less than half of the revenues for both Motorola and Texas Instruments are attributable to semiconductor sales.

The sad revenue picture

About the best thing that can be said about the first half of 1981 is that nobody lost any money, but whether they'll still be saying that in January is open to debate. Temporary plant shutdowns or shortened work weeks have already taken place at Advanced Micro Devices, National Semiconductor, Signetics, TI, and Tektronix, and recovery is not expected before the first quarter of 1981 at the earliest. Among the major U.S. chip vendors:

- National Semiconductor, besides bailing out of the bubble market, plans to shut six of its semiconductor plants for eight days before the end of this year, affecting some 12,000 employees. CEO Charles Sporck says earnings for the rest of the year will be "marginal at best." On top of this have come personnel problems; technical director Pierre Lamond has resigned, while two top financial officers were forced out in July over differences with the flamboyant Mr. Sporck.

- Texas Instruments cut its workforce 3% (some 2,800 workers) in May, and has dropped its lines of digital watches, liquid crystal displays, plasma displays, bubble memories, appliance electronics and "selected low margin discrete semiconductors."

- Intel believes that the bottom of its current cycle was hit in the first quarter when its earnings were a mere 5 cents per share. It points out that its unit volumes are at record levels, and that it has a healthy book-to-bill ratio of slightly less than 1:1. Nevertheless, dramatic improvements are not expected in the near term. Intel's saving grace seems to be that its microprocessor margins have been relatively immune to price erosion.

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In an effort to maintain profit margins, U.S. semi vendors are expected to move into areas where value-added services and proprietary knowledge will act as a buffer against the pure price competition that will continue to characterize the memory and standard logic sides of the market.

One way to do this is by helping customers develop custom chips. In San Jose, Motorola has recently opened its first regional Computer-Aided Design (CAD) facility to give its Macrocell array customers an alternative means of designing their own custom chips. The move effectively puts Motorola into the engineering timesharing business. Demand is expected to come from small vendors who can not afford their own CAD hardware. A second center for the Boston area is also planned. A host of other Silicon Valley tenants have been upping the ante in this market. Below is a quick wrapup.

- Signetics Bipolar Division has extended its custom design services so that its customers need only supply the logic diagram as circuit specification. Previously customers had to layout the chip either on Mylar or a Calma system. Now using an Ascii terminal the user merely simulates the logic function on the screen using Signetics TEGSIM timesharing program. Signetics then performs the actual chip layout. Costs are between $25,000 and $35,000, depending on circuit complexity, about twice that for Mylar or Calma procedures.

- American Microsystems says it has bridged the gap between semi-custom logic arrays and conventional hand-drawn custom designs. AMI's cell library contains already designed logic elements such as flip flops, inverters, and latches. AMI is the largest custom MOS LSI maker with 1980 sales of $130 million.

- Mead-Conway says its new system will allow designers with no IC experience to design a VLSI chip in about a month of intensive work. It claims that custom chips offer two to five times the performance of semi-custom parts, with an "order of magnitude improvement in functional density."

- LSI Logic is developing a new design automation system which is said to integrate design, simulation, layout, and test generation for logic arrays, allowing users to develop masks and test programs in their own facilities, either by timesharing or turnkey systems.

LSI Logic has also begun a joint venture with Toshiba to develop HCMOS logic array cicuits, bringing together LSI's expertise in array logic with Toshiba's acknowledged strength in HCMOS technology. The idea is to couple the low power consumption of CMOS circuits with the high speeds of logic arrays so that they can compete with the speeds Schottsky circuits usually used in computer circuit design. LSI says that the new circuits will open the minicomputer, peripheral, and communications market to CMOS technology.

Other means to diversify

Intel is the one chip maker that never seems to lose sight of the fact that it is in the computer business first, and the electronic components business second. Its development of the three chip 432 micromainframe which uses the ADA operating system is indicative of its plans to get increasingly into the processing and software business, and Intel is expected to be a leader in any firmware trends which develop.

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Both National Semiconductor and Texas Instuments are making major commitments to the speech synthesis market; TI has concentrated on the consumer end, while National Semi will serve a broader base. Earlier this year, it started offering its Digitalker chips on its Datachecker supermarket point-of-sale terminals, with the dubious concept being that as the cashier rings up each item, the machine will announce the price, allowing both the cashier and customer to rapidly verify entered information. EDP/IR believes that returns from voice research are at least a few years away.

The battle for market share

The traditional Japanese approach to any new market is to aim first at market shares and then at profitability, and in the standard memory product area this philosophy has now taken hold. Even in the still relatively virgin 64K market, a host of vendors are prepared for a price war for the top slots in the market with the belief that those at the top of the 64K hill will be the major semiconductor players for several years to come.

Many of those left standing are likely to be Japanese. Hitachi, Fujitsu, and Japanese 16K leader NEC are at the forefront of the 64K market. Behind them wait a second tier of Toshiba, Oki, and Mitsubishi. On the U.S. side, only Motorola ranks with the leaders, while TI is believed to be in the second tier. Many of TI's 64K chips are manufactured in its Japan plants, making Motorola the only supplier relying primarily on U.S. manufacturing facilities.

One of the new wrinkles to the Japanese incursion is that several of them will make the 64K products in the U.S. Among the big three, 64K plants will be run by Hitachi, in Irving Texas; Fujitsu, in Santa Clara, CA; and NEC in Sacramento, CA. Toshiba, and Mitsubishi are believed to be making similar plans, with the primary motivation being to avoid stirring up U.S./Japan trade imbalance talks and to protect themselves from U.S. import tariffs or quotas.

U.S. vendors have based their production schedules on a belief that 64K RAMs will reach price parity with their 16K predecessors sometime in mid-to-late 1982. When this level is reached the demand for the 64K product is expected to take off. Lately, there have been signs that this price parity may be reached sooner, and if it is U.S. firms may not be ready for the boom.

Intel's hopes for an early entry went by the boards when a "cell plate" problem resulted in slow chips which demanded redesigning. National Semi is focusing on high yield processes and on faster speeds, and it expects to be able to make money even when prices fall into the $6.00 to $7.00 range from the present $10 to $12 dollar mark. Both Mostek and Inmos say they will have products ready before the end of 1982, but all these assurances will mean little until reliable products are actually available.

The horns of the dilemma

Although higher margins can be had in proprietary markets with value added features, the computer memory market has been traditionally the biggest source of both dollar volumes and technological innovation, and thus any U.S. falterings in the 64K market will have serious long term implications.

The Japanese despite a late start and inadequate U.S. service and support networks have managed to capture some 40% of the 16K RAM market with only two

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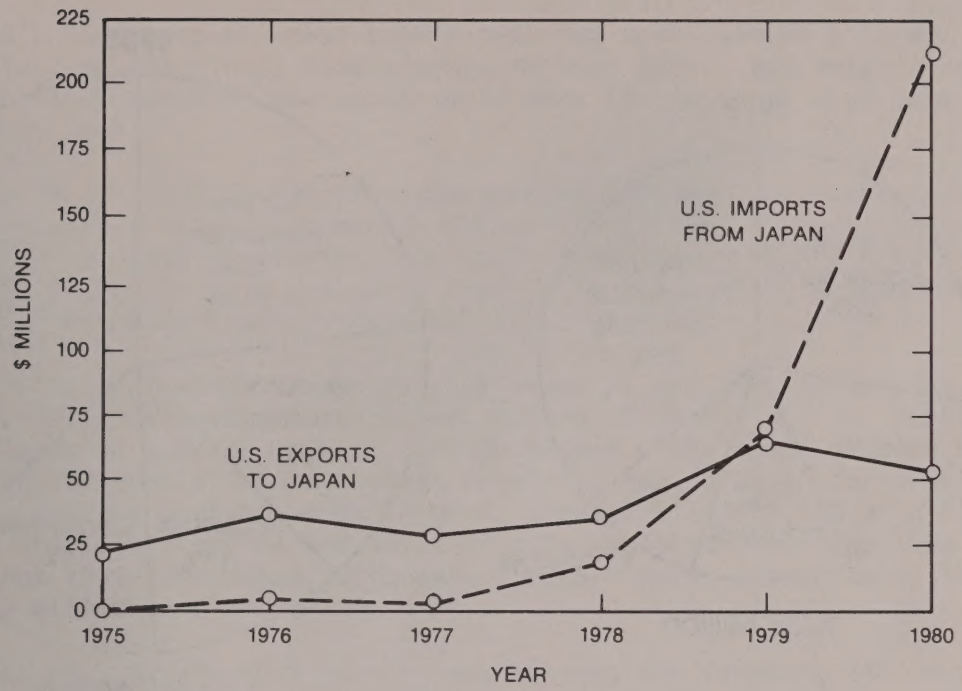
U.S./Japan Trade Balance (Total MOS)



1980 — First Three Quarters, Actual, Fourth Quarter, Estimate

Data: U.S. Department of Commerce

Source: Semi-Conductor Industry Association

or three companies making a serious push. This time around all six vendors are fully prepared and have a head start on the calendar. Standard electronic components are not an area that stimulates an overwhelming urge to "buy American," and thus, with little hope for government support, U.S. vendors will have to be prepared to stand on their own two feet, and soon.

Microprocessor market, who will control the software?

In all the fuss over IBM's big entry into the personal computer industry, little has been said about another potential big winner, Intel. If the IBM machine becomes a market leader, software based around Intel's 8088 and 8086 microprocessors may become a de facto standard for the 16-bit arena.

Presently, the U.S. microprocessor marketplace is a confusing amalgam consisting of Motorola, Intel, Zilog, National Semiconductor, TI, and Fairchild. Although 16-bit machines have not penetrated the market as rapidly as some had expected, IBM's endorsement will put pressure on other vendors to respond. Additionally, if IBM's software library concept catches on, vendors not choosing the Intel path would face significant disadvantages since individual contributors -- and even small software houses -- may not be willing to retrofit their programs for another microprocessor unit. Given its problems with the 8-bit Apple III, Apple does not seem ready to enter the 16-bit arena and is in some danger of falling behind the IBM competition.

There is, however, some confusion over the 8088. IBM has called it a 16-bit machine, but Intel calls it an 8-bit device. The reason for the confusion is that, although the 8088 can process 16-bit words, its I/O data paths are only 8 bits wide, thus the choice in terminology.

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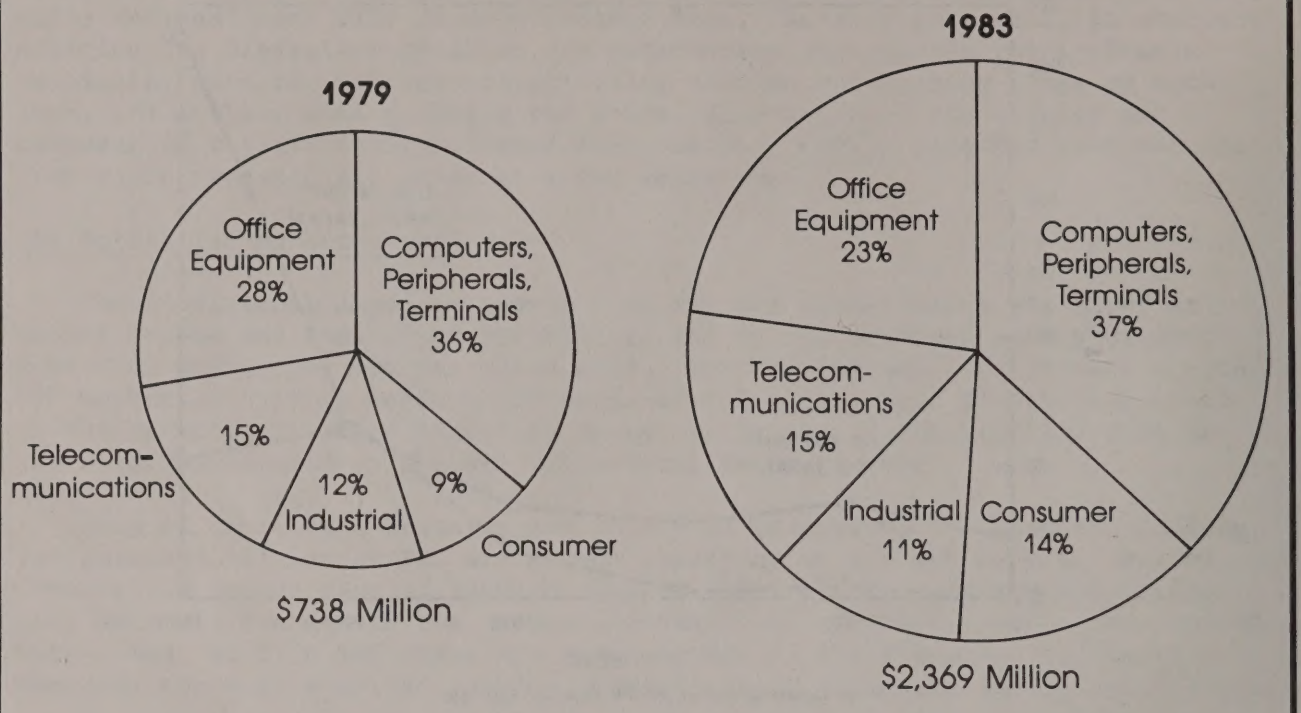
SEGMENTATION: WORLDWIDE MICROPROCESSOR MARKETPLACE, 1983



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Second source Frankensteins

Because several second sources are absolutely essential in gaining credibility within the chip-buying community, competition for reliable back-up firms can be fierce.

Over the last six months Intel and Motorola have been in an all out battle to sign up second sources. Last April, Motorola chalked up a victory when it signed up Mostek, which decided to abandon its 8086 plans. Motorola's second sources now include Mostek, Rockwell, Philips/Signetics, Thompson-CFS, NCR, and Hitachi, with the latter currently the most important.

In an impressive counterattack, Intel has recently signed up Fujitsu, adding the leading Japanese computer company to Harris, Matra-Harris and Siemens. Fujitsu will second source Intel's 16-bit 8086 and 8088 microprocessors, with production starting in the fourth quarter of this year. In lieu of cash, Fujitsu has agreed to use the Intel chips in its upcoming new generation of office equipment, expected to include a new personal computer. Other candidates for Intel backup include Mitsubishi and NEC.

Although Intel may be glad to have Fujitsu backup, especially in selling to the Asian marketplace, the move has its downside risk. Presently, Hitachi and Motorola are engaged in a rather fierce price cutting battle for the 68000. Prices have fallen some 40% over the last few months (from admittedly high levels), and Hitachi indicates that it hasn't yet reached the floor. This second source Frankenstein syndrome might someday erode Intel margins as well, even though it is likely to expand the market share of the 8086 family. Fujitsu's commitment to use the 8086 will be taken very seriously in Japan.

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BUBBLE MEMORY ... OBIT OR SHAKE OUT?

It wasn't that long ago that bubble memories were seen as a threat to both semiconductor and the floppy disk storage technologies. Non-volatile memory, high reliability, and very low costs would make it ideal for a variety of small storage tasks.

Suffice to say that so far it's not working out that way. The tarnished image of the bubble industry's market potential has sent U.S. firms into retreat. In less than six months, Rockwell, Texas Instruments, and now National Semiconductor have all waved bye-bye to the market, not deeming it worthy of the required capital investment.

Part of the problem has been that the price of per bit RAM and floppy storage has fallen faster than expected, making it impossible for bubbles to economically serve a broad market. Due to higher costs, bubbles have only been used in the special niche markets requiring non-volatile and rugged portability such as portable data loggers, special military and aviation equipment, and some graphics and point-of-sale applications. The size of this market is not that impressive, with annual bubble sales currently estimated at between $50 million and $75 million.

National Semi admits that part of its reasons for dropping its 70-person bubble has to do with their recent financial troubles -- it just can't afford the luxury of its bubble start up. The handwriting for the move first appeared on the wall in June when Jim Cunningham, director of the bubble program, left National for work at Advanced Micro Devices just two weeks after TI dropped out of the market.

In the U.S. only Intel and a reluctant Motorola remain. Not surprisingly, Intel says that it is committed to the market and has even set up a separate group, Intel Magnetics, to underscore its commitment to this technology. Intel maintains that bubble prices will continue to fall and recently reduced prices on its BPK72-2 by 40%, with promises of more big cuts to follow. Intel expects the bubble market to grow at about 100%/year.

Motorola's experience with the bubble market has been enough to elicit pity. The diversified manufacturer was a second source to Rockwell, but switched to National Semi when Rockwell packed it in. Now with National Semi dropping out, Motorola says it will try to go it alone, although it recognizes that for the foreseeable future, bubbles will remain a niche marketplace.

The lack of U.S. suppliers is certainly another opportunity for Japanese vendors, still believed to be very high on bubble technology, including lots of patent work. Hitachi, which is the main bubble vendor in Japan, will set up a U.S. sales office exclusively for bubble products, while Fujitsu is expected to introduce its new bubble products in mid-September. Fujitsu already incorporates bubble memory in some of its newer point-of-sale equipment.

But with the drop outs, the credibility of the bubble market has suffered considerably. With doubts about the long term commitment to the product, system builders will be reluctant to incorporate bubble designs, and potential second sources, looking at Motorola, might not think the effort worthwhile. Barring some technological breakthrough, only the healing passage of time and renewed stability can restore some life into this once glamorous market.

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• MA BELL, IBM EYEING TIMSHARING BUSINESS? Remember ACS, AT&T's Advanced Communications Service? It was the all-time communications panacea, offering packet-switched communication for DPers and translation between 75% of the existing data terminal population. What's left of ACS may be resurfacing as a timesharing business. EDP/IR has learned that AT&T has quietly been pitching timesharing to a few large DP users; in one case the service included onsite processing. Watch for Ma Bell to eye the fast growing $2 billion remote problem solving market, aping heavily networked services such as those provided by Tymshare, NCSS, and GE.

Equally strong are reports that IBM will get back into the service business after its 8-year hiatus. Rumors to this effect have sprung up intermittently since the 1973 settlement agreement expired in 1979, but over the last few months IBM has fanned the fire by indicating its intention to substantially increase its communications services, and thus any service bureau offerings could be expected to be heavily network oriented. Both SBS -- one-third owned by IBM --and Tymshare have asked for permission to offer wideband digital transmissions capable of bringing up to 1.5 megabit/sec directly to the user's door; by using satellite and microwave the SBS service would be independent of Bell loops. A second possibility is that IBM will set up special custom data centers dedicated to the processing needs of large and sophisticated users.

• NCR PICKS CONVERGENT FOR WP LINE. Ignoring both Hazeltine and Applied Digital Data, NCR has signed what it calls a "long term" contract to market hardware manufactured by Convergent Technologies to the word processing/office automation market. The agreement covers all of Convergent's released software and hardware products as well as several products still under development. If certain unspecified volume levels are reached, NCR may exercise its manufacturing rights. For now, it will add word processing software to Convergent's 16-bit programmable terminals. A prototype will available in a few months, with shipments beginning in the first half of next year.

CEO Anderson is making good on his pledge to enter this market. He also has hired Gary Smith from IBM's OPD as director of marketing. Look for some type of hybrid (DP/WP) system, possibly sold to NCR's 8100 small business computer base. The office products work is based in North Carolina.

• KURZWEIL SETS SIGHTS ON DG MARKET. Is Xerox taking a back road into the mainframe business? Its Kurzweil subsidiary says that it will enter the Data General compatible CPU field with a 6 MIP machine about six times faster than a Nova four and about three times faster than Point 4 Data's Mark V, the fastest available DG-compatible CPU. Called Max, the machine uses ECL-type circuits and Kurzweil's own operating system but is said to be close to Iris compatibility. Kurzweil believes that there are a lot of DG users who need more computing speed but don't want to change their software. The company credits its 1980 acquisition by Xerox for both the ECL technology and the necessary capital. Max will be sold through OEM channels.

• CORRECTION: A reevaluation of retirements in the general purpose category of the Review and forecast has resulted in the following corrections. Page 11, worldwide in use 1979, 1,276,220; international, 426,660. Page 12, worldwide in use 1979, 105,500, international 52,000.

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EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"The Gray Sheet"

MOLLY UPTON, EDITOR AUGUST 21, 1981 ● VOL. 17, NO.8 P.J. MCGOVERN, PUBLISHER

COMPUTER INDUSTRY KEEPS CLOSE EYE ON FINANCIAL INDUSTRY RUMBLINGS ... SERVICE FIRMS LOOK TOWARDS NEW OPPORTUNITIES

Inflation remains the bullwhip behind the runaway turmoil in the banking and financial communities. Without rapidly rising prices, interest rates would be in single digits, the money markets would shrivel, brokerages would not be such attractive acquisition candidates, and the banks would not be facing swarms of non-bank competition.

Because inflation has continued to overstay its welcome, the market has had to make room for it; U.S. bankers, penned in by their own regulations, have found this accommodation difficult, and thus outsiders have had a wide open window through which to enter the financial services arena.

Yet despite all the well-chronicled market shifts, the next five years promise to be even more telling, since outside competitors are still positioning themselves, and the banks have yet to deal with many of their major financial problems. And since the banking industry is worth some $2.5 billion in annual DP business, the impact on the computer industry has been, and will continue to be, profound. EDP/IR expects the following forces to hold sway:

- New non-bank participants will continue to increase their share of the financial market through the money markets, automatic overdrafts, securities trading, and credit card services. American Express, Visa and Merrill Lynch are only the most visible and powerful of a host of actual and potential entrants.

- Booming Automatic Teller Machine (ATM) networks will eventually knock down geographic boundaries, legitimizing the concept of nationwide banking, while changing the basic economics of retail banking delivery. Recently Savings & Loans were given the authority to accept deposits through ATMs on an interstate basis. Can the commercial banks be far behind?

- Banking servicers will unbundle their pricing, allowing the market to sort out the proper balance of checks, cash, credit, and debit payments in the retail economy. Transaction processing may even become viewed as a profit center as it is by computer service firms and some correspondent processing banks.

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- The dismal financial state of the Savings and Loan industry will be the driving force behind a new series of regulatory reforms, now scheduled for a March hearing by the Reagan administration. Expected to be addressed are Regulation Q, the Glass-Steagall Act, the Mcfadden Act, and the Douglas Amendment. (For those who shied away from law school, see page 3 for definitions.)

The current financial services environment

As recently as the 1960s the U.S. banking industry, although highly fragmented, was at least clearly defined; each line of banking had specific spheres of operation; commercial banks could offer checking accounts, savings banks couldn't; S&Ls dominated the mortgage business, while commercial banks concentrated on commercial loans.

Today's structure, consisting of some 42,000 depository institutions (15,000 commercial banks, 7,000 S&Ls and 22,000 credit unions) retains none of these demarcations, leaving most banks free to offer almost any service traditionally offered by any sector of the banking community. (The issuance of NOW accounts by the S&Ls is typical of this convergence.)

Yet despite these liberalization efforts, the industry realizes that it is still in desparate need of reform. The changes that have been made have not dealt with the industry's two major problems -- the interest rate restrictions of Reg. Q and the Glass-Steagall Act which restricts bank product offerings.

It's no secret that Regulation Q is the not-so-proud parent of the incredibly successful money markets. By keeping a 5% lid on savings account interest -- in the face of market rates consistently over 15% -- the banks were inviting outside competition.

The rise of these new financial providers was probably the most significant banking legacy of the 1970s. By bringing market interest rates to the $500 to $5,000 investor, compared to the elitist $100,000 club of the 1960s, an ever larger share of bank assets has seeped out of the banker's vaults and into the hands of more than a dozen major money market operations. The money markets have already adversely affected bank profitability.

In the last year this activity has taken on new import. What was once merely an investment product has started to look more like a bank account alternative, offering a variety of transactional services in addition to the attractive interest rate. Once again the word "synergy" is big on Wall Street.

For example, the combination of Visa, Merrill Lynch, and Bank One offers a checking, credit, and money market package that a bank, by itself, cannot legally match. Merrill Lynch's Cash Management Account was the groundbreaker, and has spawned not only several competitors, but the dramatic reshuffling of the Wall Street brokers.

American Express with its recently acquired Shearson Loeb Rhoades is expected to come up with similar investment/transactional packages. Amexco will set up a nationwide ATM network using existing ATMs owned by issuers of Amexco's Gold Card, currently offered by 1,800 institutions. It is expected that this plan will eventually link Amexco's credit card to a Shearson money market and in time, green card holders will also be able to participate.

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REGULATORY ISSUES IN BANKING

• Regulation Q - puts ceilings on the interest rates banks can pay on passbook or Negotiable Order of Withdrawl (NOW) accounts. The limits are 5% for commercial banks and 5.25% for S&Ls. Legislation passed in the Spring of 1980 (The Depository Institutions Deregulation and Monetary Control Act of 1980) will phase out Reg Q ceilings by 1986.

• The Glass-Steagall Act (1933) - The first major banking legislation by the Roosevelt administration. Among many other things, it barred banks from securities trading to improve stability, and thus it has kept banks out of money market type products. It also stipulates that securities firms can not engage in the business of banking.

• McFadden Act and Douglas Amendment -- In 1927 Congress adopted the so-called McFadden Act which authorized a national bank to branch within its home city if state laws permitted a state bank to do so. Despite its emancipatory origins, the McFadden Act has become a symbol of restrictiveness, forbidding national banks from accepting deposits in more than one state.

Prior to 1956, banks could expand geographically through the formation of multi-bank holding companies (BHCs). Initially BHCs were set up for branch banking in those states which restricted banks to unit banking (no branching). Even though the economic circumstances of the day did not lend themselves to geographic expansion, in several instances state lines were crossed.

In 1956, Congress passed the Bank Holding Company Act of 1956. Section 3 of that Act (commonly known as the Douglas Amendment) prohibited BHCs from acquiring a bank in another state without the permission of the state where the acquisition target was located. In the 1970s, this legislation was expanded to include single bank holding companies; it was also broadened to explain permissable non-banking activities.

A White House study released at the end of the Carter administration took a strong free-market position, recommending that the Douglas Amendment be softened, that EFT terminals be subject to "less onerous" regulation, and that mergers to take care of "the failing bank problem" should be authorized. Glass-Steagall was not addressed.

Visa has also announced its intention of getting into the money market business through its own premium card. Visa, which is ostensibly controlled by its member banks but seems to have a life of its own, is also friendly with Merrill Lynch and Dean Witter. The day when both cash and credit will be available nationwide, 24-hours-a-day will soon be upon us.

A market dependent on inflation

If inflation were to fall, interest rates would eventually come down with it and thus the difference between money market rates and bank passbook rates would narrow considerably. Merrill Lynch, American Express, Prudential, et al are attracted by the high profits of the money markets; they are not -- with the possible exception of American Express and its card processing subsidiary First Data Resources -- terribly interested in competing in the cutthroat transaction processing business. Consequently, it would be interesting to see if their aggression would continue in a non-inflationary environment.

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Unfortunately for the banks, they can not afford to hope that inflation will burn itself out. Instead they are being put into a rather difficult situation. In order to cope with their present market difficulties they may need more free-market powers, but in the long run many bankers are asking themselves "Do we really want a free market?" In the words of John Heimann, former comptroller of the currency:

> "The question is whether this [the banking] industry can continue to live in a world dominated by the lowest common denominator. Among the depository institutions, there is a history of protecting the lowest or worst part of the system, not the best. If the leadership of the ABA (American Bankers Association) really believes that we have a private, capitalistic, entrepreneurial system, then it should allow the best to be rewarded and the worst to go out of business."

The old saw that "the worst things in life begin after you get what you want" may become applicable here. In a free market, with no geographical or product restraints, a period of industry concentration is generally expected. Giants such as Citibank have been trying various means of expanding their retail business for some time, and certainly acquisitions coupled with an aggressive ATM campaign looms as the most likely strategy. At the same time, S&Ls with their heavy and unprofitable mortgage backload are not in a strong position to compete for funds in an open marketplace.

A more rational marketplace

It is this short term vs long term quandary that makes predicting regulatory decisions difficult. But although the surface teems with chaos, EDP/IR believes that ultimately the process will lead to a more rational marketplace, where institutions, services and products will stand on their own merit.

Bank One in Columbus Ohio is a good example of this new direction. Though it has grabbed a lot of headlines for its home banking experiment, a lot of the bank's profits are coming from its emphasis on transaction processing services. The 85th largest holding company has ranked among the top four in profitability since 1975. Its transaction processing revenues come from two sources:

- Processing checking account services for the 300,000+ customers of Merrill Lynch's Cash Management Account, last year worth some $10.5 million. It will also issue debit cards to Merrill Lynch customers.

- It handles credit transactions for some 160 financial institutions, giving it a back room operation equal to that of a very large bank.

Perhaps indicative of the bank of the future, Bank One assigns some 3% of its net earnings to R&D, primarily in the DP realm, where its reputation is becoming increasingly respected. As bank prices become fully unbundled, corresponent processing-for-profit may well become more of a reality.

Turning toward the future

There are few things easier to make fun of than home banking and other home-based transactional services. The cynics would point out that such schemes are expensive ways to do simple things. Who needs a computer to pay his bills, balance a checkbook, or pay $5/hr. to read the local newspaper?

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The Pollyannas of the industry could name a few other things that had been laughed at, and would suggest that home services are the ultimate in distributed processing and consumer convenience, and that their use is not a matter of if, but when. They would also rattle off the heady list of experimenters as evidence that this stuff is taken very seriously. Citibank, Chemical Bank, and Chase Manhattan lead a growing list of sponsors of home banking and other transactional services projects, usually being piggybacked onto existing viewdata/home informational services.

Despite the fact that home banking will be unable to either make deposits or withdraw cash -- the two transactions which make up the bulk of the traffic standing in bank teller lines -- it is an important market. Coupled with ever-expanding ATM networks, it will play a key role in serving certain up-scale customers with many financial transaction decisions.

ATMs and home banking should be viewed as complementary functions. ATMs are ideal for physical transactions -- getting cash or making a deposit -- but are not well suited for informational or transfer functions, where a home system would be strong. ATMs are also the one unanimously agreed upon success in the retail electronic funds transfer business. International Data Corporation, publisher of EDP/IR, believes that there are now some 22,000 ATMS installed in the U.S., worth more than $600 million. Despite this size, the market is still growing at some 35% per year, and will continue to do so through at least 1984.

It should also be remembered that home banking is more than just a fancy telephone bill paying system. It is a tool for financial decision-making, which can handle balance inquiry, loan and credit applications, account transfers, and display all types of market information, either through a home computer or a low cost terminal, using phone lines or two-way cable.

Banks are not the only groups interested in bringing transactions into the home. At least three large computer service firms are also actively looking into home banking delivery systems.

- In May, Automatic Data Processing acquired Telephone Computing Service, the leader in the telephone bill paying industry, which is also known to be preparing home banking software. Despite many difficulties, telephone bill-paying services are growing steadily at some 15% per year.

- Tymshare has acquired Payment and Transfer Systems Inc., a nationwide telephone bill paying service; it will also buy large quantities of low-cost terminals from the French firm, Matra, some of which will be used in home banking experiments.

- United American Service Corp. is offering home banking services over the CompuServe network, as part of its nationwide plan.

In fact, if the home banking industry follows the pattern of telephone bill paying, ultimately third party service bureaus will serve most of the market. ADP estimates that using Telephone Computing Service's bill paying center costs about one-third of what its licensed, in-house systems cost. Consequently, though the pioneers in telephone bill paying tended to use in-house systems, the market is now moving quickly toward the service bureau

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HOME BANKING SERVICES AND TESTS

Bank(s)	Service	Start Date	# of Users & Location	Terminal Equipment
Citibank	HomeBase	June 1981	100 -- New York area	Custom-built by TTI. b&w, text-only. Auto-dialer. 5-inch screen, full keyboard; includes telephone handset
Chemical	Pronto	July 1981	200 -- New York area	Atari 800s with direct-couple modem; autodialer
United American Computers (Knoxville)	Bank-at-Home (provided by United American Service Corp.)	November 1981	200 -- Knoxville	Tandy TRS-80 Color
Chase Manhattan	Chase Home Banking	Summer 1981	undetermined	Apple II w/48K memory; modem; disc drive
Bank One	Channel 2000	Oct-Dec 1980	100 -- Columbus, Ohio	Custom-built, decoders and keypads attached to users' ordinary TV sets
Southeast Bank	Viewtron	July 1980	* -- Coral Gables, FL	Adapted color TVs
Manufacturers Hanover	HomServe		200 -- San Diego converters w/keypad	Oak two-way CATV
Security Pacific California First San Diego S&L Home Federal S&L				

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approach. Home banking may well follow a similar pattern, especially since the computer service firms are already actively involved in the market.

Every man his own broker

Watch for Merrill Lynch to get into the home market as well. The nation's largest brokerage house has also bought a lot of Matra terminals and will use them both in-house and as part of experiments in in-home stock/financial transactions. American Express/Shearson and Prudential/Bache are also logical candidates for setting up home services. Amexco's plans for its two-way cable TV services remain unspecified.

When transaction accounts get tied into money market and securities trading, the value of the home terminal is more clearly seen. An example is Merrill Lynch which has found itself swamped in paperwork ever since it lowered its minimum check draft to $500; shifts from the money market account into a checking account could be made from home terminals. The same system could also lower the cost of simple buy/sell/transfer stock decisions. If nothing else, this type of individual control might become an important marketing edge.

Chip on a card ... much ado about not much

Over the last six months, a lot of the hot air has been knocked out of the exaggerated "smart card" hype that had swept over the retail banking marketplace. Because of its ability to store transactions on a semiconductor chip laminated into plastic cards, smart cards have been hailed as a potential replacement for cash and as the basis for off-line debiting systems. Through a yet-to-be-developed low cost reader/writer, they are also the only way yet devised to deliver cash like power directly into the home.

But the trail has been rocky. The four companies involved (CII-Honeywell Bull, Flonic Schlumberger, Philips Data Systems, and Electronique Marcel-Dassault) have all developed incompatible systems. The massive French government experiments have been both delayed and cut back in scope. The cards are too thick for exisitng machines to read, and there is little way to prevent the chip from cracking if the card is bent. Start up costs have been high.

EDP/IR believes that chip cards, or perhaps the optical stripe cards being developed by Drexler Technology, will certainly find useful applications in security/identification applications, as well as non-financial uses such as medical history. But since there is little demand for a cashless society, and since point-of-sale debiting has received little enthusiasm from either consumers or retailers, it is unlikely that chip cards will have a significant impact on the consumer transaction market in the foreseeable future.

FOR MORE INFORMATION ABOUT THE HOME SERVICES MARKET, EDP/IR strongly recommends Current Initiatives in Mass Market Transactional Services. The 82-page, single-spaced report features detailed descriptions of all major home banking, shopping, advertising, and reservation experiments in the U.S. and around the world. It examines the market outlook for each service and the major players involved, while fitting home services into a world of entertainment, cable TV, and viewdata services. Prepared by the editors of EDP/IR and LINK Resources, specialists in new electronic media, the report is priced at $750. To order, call 617-872-8200 and ask for Mary Trayte.

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• IBM CRASHES PERSONAL COMPUTER PARTY. Sure an Apple is cute, but in an age when big business is chic, wouldn't you really rather have an IBM on your desk? By coming in with an entry near the top of the price/performance pack, IBM has caught the eyes of the nation and put the chills into the rest of desktop industry. Expect a short term burst in purchasing, since with IBM's announcement there is now little reason to wait.

IDC expects big things from the 5150, affectionately known as the "acorn." It forecasts that desktops will become a $1 billion marketplace for IBM by 1985, and that IBM will grab about 25% of the market in that year. The distribution system is impressive. Large sales to corporate customers will be handled by DPD, while smaller sales will go through retail distributors; the 150 Computerland stores and the forthcoming Sears business machine centers already signed on, and EDP/IR expects other retailers to be added. IDC expects that a little less than half the sales over the next three years will come from DPD, especially if IBM adds bisync communications.

IBM's reaching out to the masses also extends to its software development strategy. The giant has established a Personal Computer Software Publishing Department which will publish programs written by IBM employees, independent software companies, and outside authors. Whose ego wouldn't be massaged by having a program published by IBM? For those entrenched in the CP/M side of the software marketplace, IBM has contracted with Digital Research to make that operating system available.

In an unusual move for IBM, it went outside to get the parts -- a Japanese (Epson) printer, a Taiwanese screen, floppies from Tandon, and a 16-bit Intel 8088. How this will affect availability and profitability remains to be seen.

• IBM TO SUPPORT THIRD-PARTY LEASE PROGRAM. Is IBM considering off-loading some of its lease burden? In an unprecedented agreement with Citicorp, IBM has agreed to cooperate with a third party lessor. Effected immediately are low-end products -- the S/34, the new S/23, and the executive model 102 copier from OPD -- all sold on a purchase only basis by IBM. Such a program for larger machines would give IBM more control over its earnings, since it would not have to run low purchase/lease ratios in order to pick up outright sales. The only other products sold on a purchase only basis by IBM are the Series 1 and the 3101 asynchronous terminal.

• MAGNUSON ENTERS LOW-END MACHINE. The M80/30 has about 75% of the power of Magnuson's M80/31, or about 1.5 times the performance of the IBM 4331-1, and with a price of 86,000 for a standard 512K version, it is priced a little above the IBM machine. Deliveries will start in September.

• SBS LOOKS TOWARD SMALLER USERS. When originally designed, Satellite Business Systems was for large companies capable of justifying their own Earth stations. Now the logical step of providing microwave links to central SBS stations is being applied for, and pending FCC permission, SBS will serve smaller users, wading deeper into the datacom waters, once reserved for AT&T.

• CORRECTION. Vol. 17, No.7, page 6 -- 370 138/148 SNA percentages should be reversed, and (in last line of page) 45% of IBM sites will use SNA by 1985.

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EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"The Gray Sheet"

MOLLY UPTON, EDITOR AUGUST 7, 1981 ● VOL. 17, NO.7 P.J MCGOVERN, PUBLISHER

IBM OPENS DOORS TO PACKET NETS; HONEYWELL WELCOMES SNA

X.25 is neither a Russian spy plane nor a communications panacea. It is, quite simply, a recommended standard for assembling data into a form acceptable by public, packet-switched networks. With IBM's decision to support X.25, public data networks will now be accessible through certain IBM equipment, either through new software added to 3705 controllers or adapters attached to terminals or SNA processors.

SNA, on the other hand, does promise to be a panacea -- at least someday. It links together most IBM hardware, not by sending packets, or using public circuits, but rather by defining how responsibilities for various communications functions are distributed in a private, and largely homogeneous network.

Yet despite these different objectives and concerns, IBM and X.25 are often pushed onto the same stage, cast in familiar IBM vs. non-IBM terms. Under this disguise, distortions and misrepresentations abound. Among them:

- That compliance with X.25 is indicative of doubts about SNA. If SNA were in trouble, and it isn't, it would not be due to any competition from the slow-terminal-oriented public data nets.

- That X.25 itself is indispensible. In fact, most Public Data Network (PDN) users possess nothing more than a dumb terminal, with the X.25 protocol functions taking place at the local network node.

- That this is a big boost for IBM users. Users of high speed, buffered 3270s are not ideal customers for public data network services because inherently they have less need to save on line charges. They are also less likely to stray from their private networks and dedicated applications. Both Tymnet and Telenet have offered 3270 support, but with little enthusiasm.

Nevertheless, the IBM announcement should have significant ramifications. Not only will it put the final symbolic stamp of approval on X.25 -- even if all X.25 networks are not alike -- but it should also make it much easier to interface non-IBM equipment to an SNA network.

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Background

The announcement comes as no surprise. In May, IBM had announced its intention of supporting international standards, and shortly thereafter GTE/Telenet certified IBM's X.25 interface for the Series 1, making it available on a Request for Price Quotation (RPQ) basis.

IBM has also supported X.25 in Europe where, because of poor quality voice-grade lines, packet switching and public data networks are much more important. In Europe, X.25 compatibility has become obligatory, and the feeling, if not the market, has apparently spread to the U.S.

But IBM was pressured by users with heavy transAtlantic communications -- especially banks and other financial institutions. These groups will now be able to take advantage of the public carrier's leased transcontinental Bell lines, sending packets acceptable by the European X.25 networks.

In the U.S., however, the announcement is likely to serve more of a marketing than a technological need. If nothing else, X.25 makes for a comforting option. It will help to ease the worries of those who fear that some vaguely understood, international X.25 conspiracy is going to isolate their IBM machines, locking them into IBM product lines.

It will also throw a curve to companies such as Systar and NCR Comten which make front ends with X.25 capability for use with IBM machines. (Systar works with S/34 and S/38s, while Comten aims directly at 3705 and the IBM mainframe market.) Any SNA network, with the exception of those based on a 4341, requires at least one 3704 or 3705.

Correspondingly, the move shows that there is still some life in the 3705s, long rumored to be on their way out the door. If IBM wanted to phase them out it probably would have introduced X.25 on its new generation of front-ends expected to come with the H series.

X.25 and ISO, gateways to SNA

Only in the future could X.25 acceptance significantly affect SNA, and even this is somewhat doubtful. The first three levels of X.25 are compatible with the Open Systems Interconnect (OSI) model developed by the International Standards Organization (ISO).

The OSI model is a network and communications architecture being developed by both government and private industry -- including AT&T and IBM -- in both the U.S. and Europe. It has the backing of both the American National Standards Institute and the National Bureau of Standards. The layers in the OSI model resemble those in SNA and it is generally believed that brigdes between the two systems can be built.

Because the first three levels of the OSI are compatible with X.25, vendors with X.25 capability -- these days practically everyone -- wishing to tie processors or terminals into IBM nets might look toward the OSI model for a non-SNA standard, especially since SNA specifications are not fully published.

That IBM is accepting X.25 may indicate that eventually it will accommodate the OSI model as well, especially since over the last year IBM has expressed

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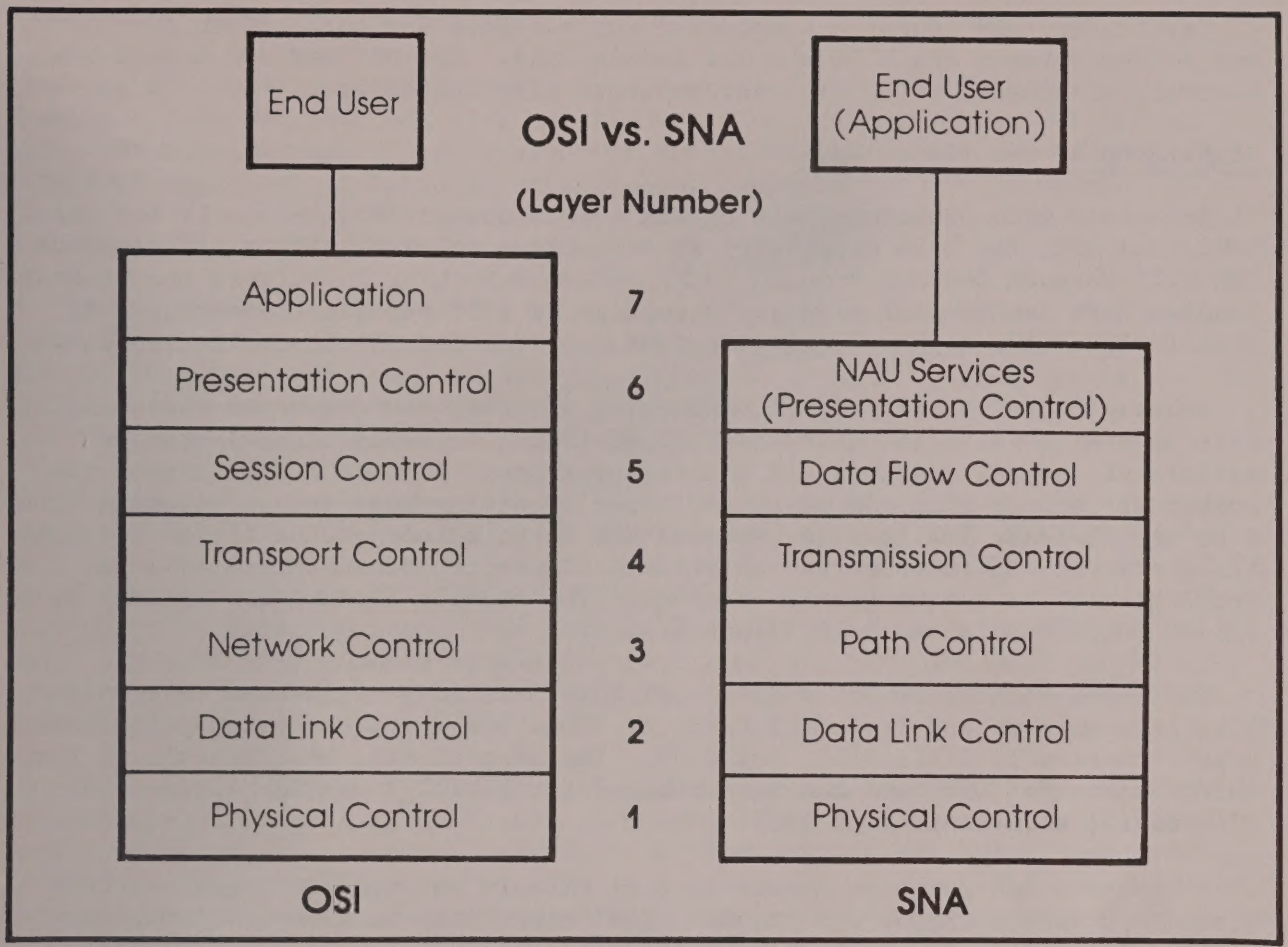

its support for the project. Unfortunately, much of the OSI remains unspecified, and thus vendors now wishing to talk to SNA are likely to follow the SNA path, as Honeywell has just done.

Layered architectures

Both X.25 and SNA use layered architectures (see charts above). Like other X.25 supporters, IBM will support the first three layers of X.25. Level one is based on X.21, which is also used in circuit switched (like dial up) or leased circuit communications.

Level one of X.21 describes the physical interface between the terminal and circuit equipment, similar to RS-232-C. In fact, X.21 was developed because RS-232-C was not well suited to all digital public nets. X.21 uses a 15-pin connector compared to 25- and 37-pin versions for RS-232C and RS-449, respectively. X.21 also has its own link control procedure.

Link control procedures can be either character- or bit-oriented, and comprise level two of both X.25 and SNA. IBM uses Synchronous Data Link Control (SDLC), while X.25 uses High Level Data Link Control (HDLC); both are bit-oriented protocols. Discrepancies between the two are considered minor.

To support X.25, however, IBM had to support up to the third level. Level three of the X.25 recommendation is a set of packet formats and procedures for use by packet nets. It is quite different from SNA's path control function.

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Levels four and higher are reserved for software and application functions, and differ between the X.25 and OSI models X.25. The OSI and SNA models are, however, considered to be at least theoretically compatible.

Highlights of the IBM release

For users with certain models of IBM's 3705 controllers (model II and the M-81, and 82), the X.25 capability is strictly a software affair. Called the IBM X.25 Network Control Program (NCP) Packet Switching Interface, the program handles both the transmission and reception of X.25 based data packets. It also includes the higher level functions required for SNA communications.

Release 1 of the NCP program containing the basic interconnect features will be available in the third quarter of 1981. Releases 2 and 3 provide additional control and enhanced interconnections. Release 2 will expand the number of packets that can be sent without receiving node acknowledgement from 8 to 128; Release 3 will allow several SNA network nodes to be linked through X.25 networks, an interesting capability. These two enhancements will be available in the second quarter of 1982. The monthly license fee for any or all of the NCP releases is $190/month.

For those without 3705s, IBM Network Interface Adapter is used to convert SDLC protocols to and from X.25 formats. This box can also be used with GSD gear -- Series/1, S/32, S/34, and S/38. The adapter will be available in the third quarter of 1981 and can be purchased for $9,100; two-year leases are $270/month, with rentals of $317.

3705 users can purchase access to X.21 circuit switched or leased circuit lines for between $1,550 and $2,600. X.21 capability is also available on certain SNA models of the 3274 control unit, the 3276 control unit display station, and the 8100 information system.

Interestingly, X.21 purchase is not a prerequisite for IBM's X.25 support. Instead, IBM seems to view X.21 as an alternative transmission technique, saying that: "In an SNA system, X.21 or X.25 services could be used to transmit data between processors, terminals, and controllers." X.21 networks already exist in Japan and Scandinavia, but not in the U.S., and thus some observers believe the move may anticipate an X.21-based non-packetized network in the U.S. IBM's recent decision to put X.21 support on to the 8100 would suggest that X.21 will be heard from again.

At this time there is little doubt that SNA is ahead of the ISO model as an accepted international standard. Nevertheless, because of its master/slave architecture, SNA is not suited for certain environments where standards for interconnectivity will be needed. Unlike the PDNs, SNA networks are dependent upon a large host machine.

This dependency may be detrimental to IBM as it prepares its local networking scheme. SNA was designed to link remote locations over telephone lines; it is not the most efficient means to hook together geographically close devices. Since existing local network topologies are not host dependent -- SNA and the Ethernet specs are incompatible -- IBM may find it difficult to crack the local network market, especially as word and data processing systems are merged. Consequently, the relationship between SNA and IBM's eventual local network plan is eagerly awaited.

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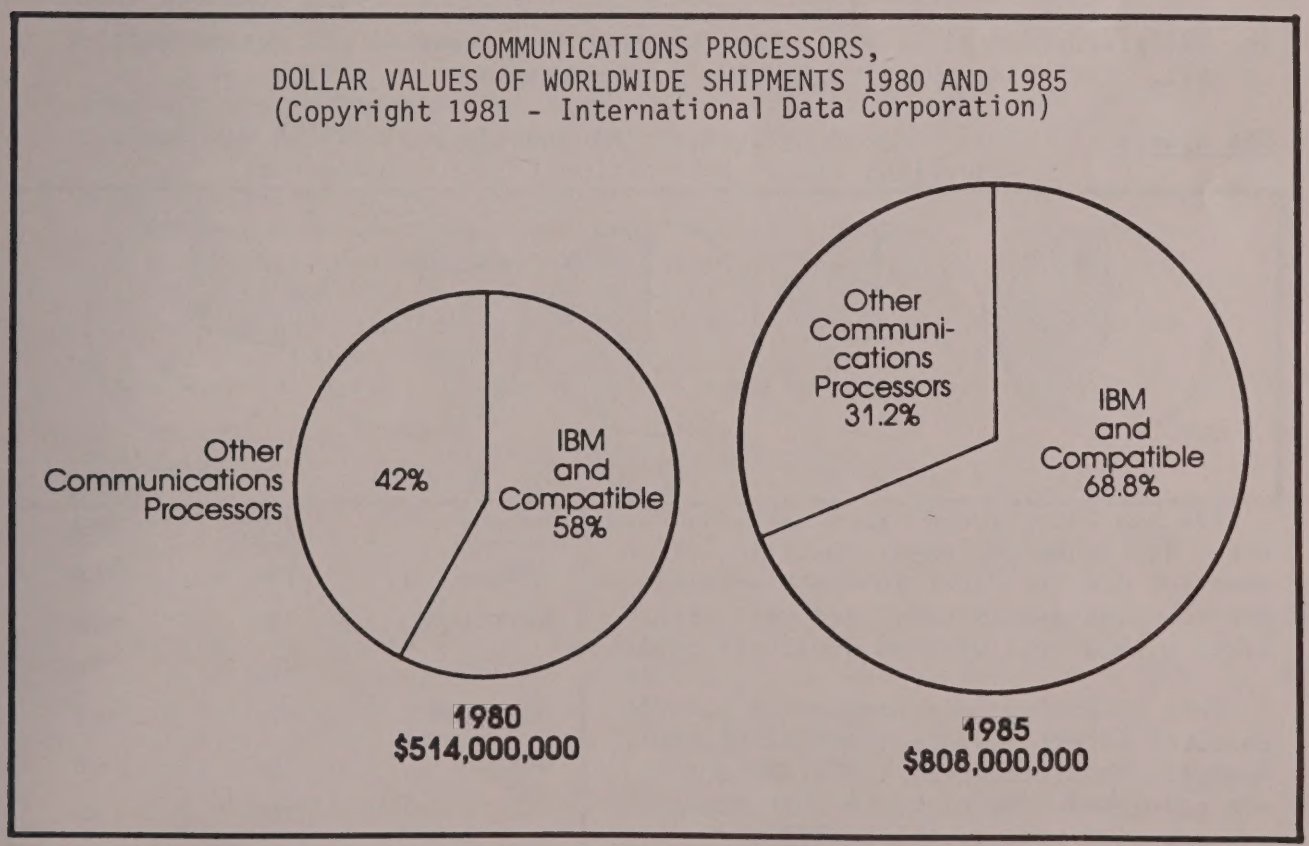
THE IBM COMMUNICATIONS PROCESSOR MARKET ... A SNAP SHOT

Just as with CPUs, the communications processor market breaks down into two realms -- IBM and non-IBM, with the IBM world owning just under 60% of the pie. Because communications processors are often the single most important piece of equipment in large DP shops, users are reluctant to leave the IBM fold, and plug compatible vendors must live up to top quality maintenance and service requirements.

The key product is the 370X, which accounted for nearly 40% of the value of communication processor shipments in 1980. Competitors to the 370X include Comten, Memorex, and Computer Communications Inc. (CCI). Comten is by far the leader, shipping more than $70 million worth in 1980; it is also the only vendor of IBM compatible 370X front ends to offer SNA support.

Comten's approach has been to go after the high end. Its machines cost more than IBM's but they offer more channel capacity and more intelligence, and are geared to very large networks. Memorex has concentrated on making 270X models, but recently introduced its 2500 series designed to link non-SNA IBM users to X.25 networks. (The IBM 270X series has been around since 1973 and is a hard-wired, non-programmable unit that has retained user appeal to those still increasing their 270X networks.) Both CCI and Memorex have had trouble making money in this business.

A new report (The Data Communications Equipment Market 1981) by International Data Corporation, publisher of EDP/IR, details the modem, multiplexer, and communications processor markets. It predicts the following communications processor market shift by 1985.



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Honeywell aims at DDP market thru SNA

Honeywell's upgradable DPS 6 and Level 6 lines of computers have always been geared to distributed processing tasks, where their flexibility is especially important. The company has long offered IBM bisynchronous communications and it has extended this support to include SNA.

To talk to SNA, Honeywell processors will work as standard IBM controllers in an SNA network, in addition to their normal processing tasks. Honeywell's entry-level DPS 6/30 and high end 32-bit DOS 6/96 span a range equivalent to that between the IBM Series 1 and the 4300 series. Honeywell's Gcos 6 operating system is used on all 16 machines in this range, giving users a smoother upgrade path than IBM can offer. A summary of the announcement highlights:

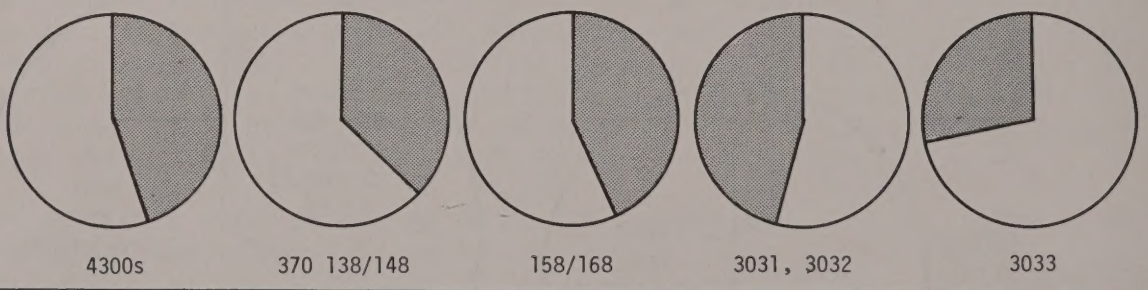
- SNA interactive facility - allows Honeywell CPUs with WST7200 and WST7801 workstations to appear as 3274 controllers.
- SNA RJE facility - Allows Honeywell CPUs to act as IBM 3777-3 controllers.
- SNA transport facility - provides SNA protocol services, supporting emulation of multiple devices on a single link.

Honeywell has no intention of throwing all its eggs into the SNA basket. It will stick with its own OSI-based Distributed Systems Architecture. The SNA comes "in response to needs stated by SNA users for flexible, multifunctional satellite processors which have communications capabilities and are hardware and software compatible across a broad range of power." This from Michael Keliher, vice president and general manager of marketing.

The SNA products will be available for general release in the second quarter of 1982. X.25 SNA support will also be forthcoming.

SNA update

% OF CPUs RUNNING SNA (white area)
(Copyright 1981 - International Data Corporation)



SNA has been around since 1974, and has taken its share of lumps. Back in 1978 when IDC did its first in-depth analysis the tone was pessimistic, and SNA looked liked a hard sell with an uncertain future.

This situation has changed. A new IDC research report reveals that 48% of IBM's domestic mainframe CPUs (370/135s and up) are using SNA. It predicts that this percent will rise to 45% by 1985.

Vendor	X.25	SNA
IBM	Yes	Yes
Burroughs	Yes	Yes
Univac	Yes	No
Honeywell	Yes	Yes
NCR	Yes	No
CDC	Yes	No

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IBM also beefs up the 8100

If SNA and X.25 aren't confusing enough, consider the IBM 8100. Though its initial sales figures were not very impressive, and though the role of the machine is still not clearly understood, EDP/IR expects the 8100 to emerge as a key ingredient in both IBM's office and SNA networking plans. It is also IDC's opinion that the 8100 contains innovations in computer architecture not seen from IBM since the introduction of the 360 and OS in 1964.

The 8100 can operate as a standalone system, as a part of network of interconnected 8100s, or as a satellite to an IBM mainframe. Presently, the latter is by far the most common, with over 90% of the 8100s shipped in 1980 operating in distributed processing environments.

Unlike IBM mainframes, the 8100 was designed with SNA in mind, and is thus well-suited for telecommunications functions. It also has a 32-bit addressing (translating to a potential address space of 4 billion bytes), indicating that it could eventually be part of very large virtual storage systems.

With all this potential, EDP/IR expects further enhancements to the 8100 to become commonplace. Over the last two months, IBM has made three such improvements; one hardware, and two software, improving the 8100's position in both DP and office tasks. The highlights:

- Three new processors. New models of the 8140 (C72, C82, C92) are said to offer 60% more performance than the 8140B, with only a 20% increase in cost. Among the enhancements: main memory up to 1.5 or 2MB (up from 1MB); error correction codes, and support for X.21 connections for switched or leased lines. Unlike earlier 8140 models, the 8140C uses a dual processor configuration, only one of which is capable of operating alone. IBM suggests that the new models are well suited for transaction processing tasks such as those for airlines, insurance companies, and universities.

- New systems management software. Said to allow a "new level of integration between host processors and 8100 systems." Included is a Terminal Access Facility which allows an operator to control IMS/VS and CICS/VS from a single terminal, monthly license is $68. It also allows control of multiple DPPX 8100 systems when used with a new Host Command Facility, which is licensed for $150 per month. New error detection and analysis software has also been added.

- Electronic mail and document distribution. Last summer IBM brought the 8100 into the office with the introduction of the Distributed Office System. With its ability to handle text processing and its ready access to DP functions, the 8100 is at the forefront of IBM's efforts to merge the gear of its three divisions.

  Version 2 of DISOSS (Distributed Office Support System) takes care of electronic mail and document distribution between mainframes and 3732 text display terminals or 8775s. Messages are automatically routed and stored at the local 8100. Previously they had to be called down from the host. 8100 users can also direct host high speed printers, and prepare documents at the 8100 for batch input into the STAIRS database.

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• BURROUGHS MOVES AFTER MEMOREX. What ever happened to CEO Blumenthal's stated intention of clearing the decks of non-profitable operations? In a surprising move, the Detroit mainframer has offered $105 million for the ailing storage product vendor, easily outbidding STC's second-time-around offer of $85 million. Memorex has been in the red for five years.

Blumental has said that Memorex will operate as a "free-standing" subsidiary, but the two will engage in joint product development and manufacturing; he also added that certain Burroughs products would be sold by Memorex to its OEM customers and that Burroughs was particularly attracted by Memorex's overseas sales and service organization. As of this date, Burrough's shareholders have approved the sale, but Memorex's had not. Unless another company ups the ante, the deal is expected to be consummated soon.

• HP TAKES TO THE AIR TO SHOW NEW DESKTOP. Using a live teleconference to 37 U.S. cities, Hewlett-Packard introduced the HP 125, a $7,500 multi-function desktop. The 125 uses twin Z-80 microprocessors, one devoted entirely to ease-of-use features such as HP's "softkeys." Among the many features are word processing, graphics, Visicalc, and terminal connections to the 3000 series. The 125 will be sold through dealers, stores, OEMs, and direct sales efforts. The teleconference was very well received and was also used to introduce the product to HP's sales force.

• MID-YEAR REPORTS SHOW GOOD TIMES, BAD TIMES ... STRONG DOLLAR PICKS UP MOST OF BLAME. The giants of the industry have had better semesters. With the dollar running high because of high U.S. interest rates, earnings from foreign operations translated to fewer U.S. dollars. Results of the first six months show that sales were generally up despite high interest rates. This is not necessarily good. If sales are high, but earnings still flat, the long term picture is uncertain, since the steady revenue stream from lease and rentals can not be counted on. Most of the vendors are expecting uninspiring second halves. A quick rundown, with comparisons to first 6 months of 1980:

- IBM - net earnings $1,534 million, up 6% from the same period last year, revenue was $13.4 billion, up 11%. Earnings per share up 5%. Sales up 19.6%, rentals up 0.2%, services up 21.4%. The high sales figure probably reflects IBM's consistent lowering of its purchase/lease ratios on mainframe equipment, encouraging outright sales.

- Burroughs - Revenues up 13% to $1.6 billion. Sales up 14%, rentals 4%, services up 14%. Net earnings down 51%.

- CDC - Computer business revenue up 13% to $1.5 billion, earnings up 29%. Sales up 12%, rentals up 8%, services up 16.2%.

- NCR - Revenues up 10% to $1.6 billion. Earning down 3%. Chairman Anderson reports that earnings would have been up if currency levels were the same as last year. More than half of NCR's business is outside U.S.

- Honeywell - Revenues up 9% to $2.5 billion (not all computer). Earnings up 23%. Sales up 8%, service and rentals up 11%. Honeywell expects earnings to taper off in second half.

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Desktops on the horizon

FUJITSU AND NEC ANNOUNCE NEW PROCESSORS, EXPECT STRONG DOMESTIC AND INTERNATIONAL MAINFRAME SHIPMENTS

In a battle of splashy press releases, Fujitsu and NEC have announced new high performance mainframe computer models, the former's in response to IBM's 3081. Yet more important than the respective claims of "World's largest and fastest" and "World's best price/performance" are the high expectations for mainframe sales on both the domestic and export fronts.

These expectations are not unfounded. Spurred by banks and government agencies, the Japanese mainframe market is expected to be strong at least through 1982. 3081 bookings have been so brisk that IBM Japan has moved up the delivery dates from October to September in an effort to reach double digit sales growth for the first time in several years. EDP/Japan Report, International Data Corporation's Tokyo-based newsletter, reports that IBM Japan has already received orders for more than 100 3081s.

Overall, Japanese mainframers are expecting fiscal 1981 growth rates in the 8% to 18% range. (Most Japanese fiscal years begin in April.) According to figures estimated by EDP/JR sales from the ten leading Japanese firms should reach some $9 billion in this fiscal year, up 10% over fiscal 1980.

Fujitsu's 3081 response had been expected for some time. As the number one computer company in Japan -- it first topped IBM in 1979, and beat the giant soundly in 1980 -- its machine was becoming overdue. Hitachi made its 3081 response in February, while NEC introduced an equivalent size machine in September, two months before the IBM announcement.

With the M-380 and its M-382 multiprocessor version, Fujitsu has once again stepped into the technological upper echelon. According to Fujitsu, the M-380 has 50% more power and up to twice the main memory as the announced 3081. But all the power will not come cheap, with rental prices of $250,000/month, more than twice that of the IBM machine.

Fujitsu expects to sell at least 150 M-380s and 382s (100 of the former, 50 of the latter) over the next four years. Overall, it plans to sell some $2.15 billion of electronic equipment in 1981, up 12% over 1980.

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Although the new machines will not be available until the third quarter of 1982, many of the specs have already been announced, presumably to keep customers patient. Among the technological highlights:

- The M-380 is the first IBM-type machine to offer 64MB of main memory, equaling that of NEC's ACOS 1000. That Fujitsu also introduced a multiprocessor version indicates that it plans to follow IBM along the tightly-coupled processor path.

- A dual buffer system will significantly increase processor performance by bridging the gap between the logic circuit speed (0.35 ns) and the memory access time (200 ns). A "local" 64K buffer is placed in the CPU with an access time of 5.5 nsec; and a "global" buffer of 256K sits between main memory and the CPU and has an access time of 200 nanoseconds.

- A new cooling concept. Stacks of up to thirteen multichip carriers, each containing up to 121 logic or memory modules will be cooled by air blown "horizontally" into each stack. Fujitsu claims that this method is so efficient that no other system -- such as water or helium -- is necessary to supplement the air cooling mechanism.

NEC, which had announced its 3081 competitor -- the ACOS-1000 -- last September, has brought out the ACOS 750 and 650, with 60% and 30% of the power of the 3081, (roughly in the range of the 3033U and 3033N, respectively). Logic density and price/performance are being emphasized; NEC claims that a new multichip packaging system can pack 20,000 gates into 10 cubic centimeters (less than 1 cubic inch). Up to 240 LSI chips can be loaded onto a single card board. The systems are aggressively priced, with rentals starting at $75,000- and $50,000/month, respectively. NEC hopes to sell a total of 200 of these machines over the next four years.

U.S. impact

Of course, any discussion of the Japanese inevitably comes around to their eventual impact on the U.S. and international markets. IDC, publisher of EDP/IR, has produced the first of a four volume study on the Japanese impact, and this report plus independent research by EDP/IR and EDP Japan Report has come up with the following market findings and expectations.

Best estimates are that Japan will export $500 million worth of computer products in fiscal 1981. Not surprisingly, the leader will be Fujitsu which shipped $184 million in 1980, mostly through Amdahl and Siemens. However, 1980 was not a banner year for Fujitsu which had predicted sales of $220 million. The company attributes this to a slump in overseas mainframe markets.

It is expected that within the next twelve months, Fujitsu will commence sales of its M-130, -140, -150, and -160 machines (comparable to the 4300 line) in the U.S. through TRW-Fujitsu, which currently is only selling the V830 and V850 small business systems. The M-series is close to being IBM compatible, only minor changes are said to be necessary. But Fujitsu remains loathe to call itself a PCM manufacturer, saying it wants to sell systems, not just CPUs.

Nevertheless, with the PCM outlook for 4300 type machines looking up -- if only because of the huge numbers to be shipped over the next few years -- the

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TECHNICAL SUMMARY OF THE RECENTLY ANNOUNCED LARGE SCALE COMPUTERS

	Fujitsu*	Hitachi		NEC			IBM
	M-380	M-280H	M-240H	ACOS 1000	ACOS 750	ACOS 650	3081
# CPU	1-2	1-4	1	1-4	1-2	1-4	2**
Main Storage Capacity	16-64	16-32MB	2-8MB	8-64MB	4-16MB	8-32MB	16-32MB
Buffer Memory Capacity	64KB	64KB	32KB	128KB	32KB	16KB	64KB
CPU Logic Circuit Type	ECL	ECL	ECL	CML	CML,MOS	CML,MOS	TTL
CPU Logic Circuit Density	400,1300	550,1500	550,1500	200,1200	1200,6000	1200,6000	704
CPU Logic Circuit Speed	0.35ns	0.45,0.8ns	0.45,0.8ns	0.5,1.0ns	0.5ns	0.5ns	0.5ns
I/O Channels (Max)	32	32		64			24
Index of Power***	1.5	1.5	0.1	1.5	0.6	0.3	1
Date of Announcement	5/81	2/81	2/81	9/80	6/81	6/81	11/80
First Customer Shipment	9/82	12/81	12/81	12/81	5/82	6/82	12/81
Minimum Configuration Monthly Rental (200 yen=$1)	$250,000	$200,000	$50,000	$150,000	$75,000	$50,000	$116,250

Notes: * Fujitsu brought forth multiprocessor model, M-382, in addition to the M-380.
** IBM 3081 employs dyadic CPU system.
*** Index of power based on IBM 3081=1.

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market for M-130s through M-160s as PCM machines can't help but be noticed. Magnuson, IPL, and Cambex may well have a new competitor.

TRW-Fujitsu (TFC) is also selling an on-line teller system for branch banks, the 5200 system, and a 7880 retail point-of-sale terminal; both combine lots of memory and include features at the forefront of their respective markets.

In June, TFC announced plans to sell a high end, 16-bit desktop, designated the Affinity 16. Scheduled for delivery in September, the system will include 128K memory, two minifloppy 320K drives, and up to 2.5 megabytes of auxiliary floppy storage. Programmable in BASIC, the Affinity 16 will cost from $6,000 to $10,000, depending on configuration.

Fujitsu's claims that its Eagle, a 10-inch Winchester drive, offers the best price/performance in the disk marketplace. It will most likely be used in the mini market, where 8-inch Winchesters have often proven too small, and 14 inch too expensive.

Japanese vendor roundup

Hitachi is also predicting improved business for its large systems. It has forecast export sales of some $125 million mostly to its OEM customers of National Advanced Systems, Olivetti, and BASF of West Germany. All OEM M-series machines must be modified for IBM compatibility.

Even in the salad days of the Hitachi/Itel link, monthly shipments rarely exceeded 6 systems, but for 1981, Hitachi expects to average about 10 sets a month including the M-280H, its 15 MIP response to the 3081. At this time, Hitachi is not considering direct mainframe sales in the U.S. With a U.S. sales force of "around 20," Hitachi is expected to limit itself to matrix printers and 8-inch, fixed-head disks for the time being. It does supply 3350 type disks to NAS, and will supply a 3380 version when the market dictates.

The 280H was announced in February with deliveries scheduled for December of this year. The chief enhancements over the earlier M-200H line are twice the main memory (from 16M to 32M) and twice the number of channels, again from 16 to 32. Hitachi believes that limitations on main memory size and number of channels are the chief weaknesses of the M series -- and 360/370 -- design.

Lagging just behind Hitachi, NEC hopes to export $105 million worth of computer equipment in 1981. Its ACOS 250 is being put up against IBM's System 38. Although architectural differences do exist, NEC claims to have solved the problem of upgrading IBM users from the System 3 to the ACOS 250. Most of this marketing effort has taken place in Japan and other parts of Southeast Asia.

Since the mid 1970s, NEC has concentrated its U.S. efforts on its Astra small business system and its Spinwriter character printers. New models of the Astra series will apppear soon and will be sold in the U.S., Australia, and Southeast Asia. NEC has also been selling its PC-8001 desktop in the U.S. since early this year. For those seeking advanced teleconferencing expertise, NEC is said to be a world leader, befitting its self-professed image as "The C&C (computers and communications) Company."

Among the other major Japanese vendors, Mitsubishi has taken a new American tack. Last July it eliminated its Melcom Business System subsidiary, and made

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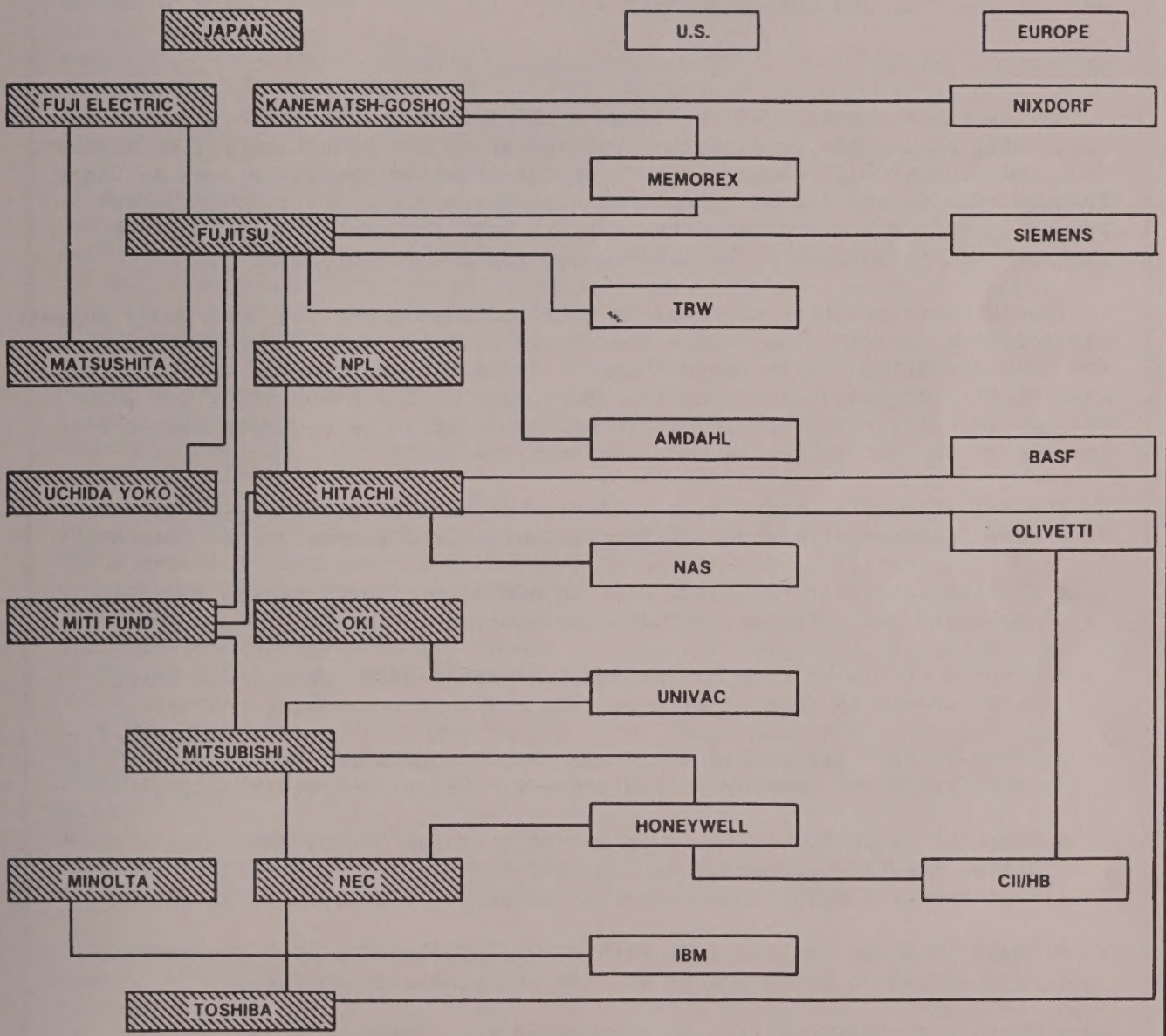
EXAMPLE OF JAPANESE PARTICIPATION IN WORLDWIDE COMPUTER MARKET



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that operation part of Mitsubishi Electronics of America (MEA). That organization doubled its equity last year to $1 million, and increased its total number of employees from 30 to 80. The company hopes to export $35 million in 1981, up 40% over 1980. MEA concentrates on chips, disks, CRTs, and small business systems.

Oki will continue to concentrate on printer sales, both serial and line. With the boom in desktops igniting the low-end market, Oki expects to grow at least 20% over 1980. Out of its 29 million in export sales last year, 53% went to the U.S. and 40% to Europe.

Desktops

Unlike other segments of the Japanese DP industry, the desktop market in Japan will apparently produce two types of vendors. Mainframers like Fujitsu, NEC, and Hitachi will compete with consumer-oriented companies such as Canon, Toshiba, Casio, and Sharp. Since the Japanese tend to see microcomputers as primarily a consumer product, the edge may well fall to the latter group, although NEC is currently the leading desktop seller in Japan.

Though their relative weakness in microprocessors and software would suggest difficulties, neither looms as a short term obstacle to the U.S. market. With the CP/M operating system approaching an industry standard and with the ready availability of standard processing chips such as the Z-80, 6800, and 8080, neither software nor microprocessors are expected to be decisive competitive grounds as the market swells over the next few years.

The key areas will be price, quality, and low-cost peripherals, all of which are Japanese strengths. Below are possible Japanese export models:

- Toshiba's desktop 64K T/200 uses an 8085A, Digital Research's CP/M, and Basic 80. Prices, including printer, start at $5,000.

- Canon's CX-1 with from 32K to 96K RAM uses a 6809, Cobol, and Basic. It is geared to commercial uses, but has word processing software.

- NEC's PC 8000 series has CP/M, uses Z-80A equivalent microprocessors, and Basic developed by Microsoft. CPU prices start at $1,600.

- Panasonic's JD 850 is based on an 8085; it has 56K of RAM, uses Basic, the CP/M operating system, and 1 Mbyte floppies. It is also experimenting with touch-sensitive screens. Prices start at $5,000.

- Casio is in on the low end, with a 16K Z-80-based system expected to sell for about $750. It is also in the hand-held business.

- Sharp's YX-3200 has its own version of Basic with CP/M. It comes with an 80-line screen and with 32K or 72K ROM, and either 64K or 112K RAM. Sharp also has sells a pocket computer, the 1211.

- Sanyo has yet to sell desktops in the U.S. It does, however, have a substantial share of the Japanese market. Like Sharp, it has a background in point-of-sale terminals. Its desktop is CP/M-based.

- Fujitsu's Affinity 16, see page 4. Prices from $6,000 to $10,000.

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JAPANESE VS. U.S. TECHNOLOGY . . . HOW THEY STACK UP

IDC's report, The Impact of Japanese Vendors, provides comparisons in all key technological areas. Among those singled out as important by EDP/IR:

• Software. Though the language barrier remains substantial, IDC believes that the main stumbling block to the development of the Japanese software industry has been the characteristics of the domestic market. Because of users somewhat irrational preference for custom software, the packaged software industry has lagged far behind that in the U.S.

Even today, the great majority of Japanese software is developed either in-house or by the manufacturers, and this has worked to the detriment of high quality, low cost software products. There are indications that this is starting to change, as software unbundling becomes more commonplace.

• Production. The U.S. semiconductor industry is still doing its bonding and testing by hand. There are at least two Japanese companies that have completely automated the bonding process; government support has been evident in this area. Japanese use of robots has been well documented elsewhere.

• Small Business Computers. In contrast to the minicomputer market where the Japanese have done very Tittle, the small business computer arena is bursting with activity. With more than one dozen proven vendors, SBCs look like a stronghold, especially in multiworkstation systems, which are now moving up towards 2 megabytes.

• Desktops. Home education and entertainment uses are taken seriously in Japan. Heavy emphasis on voice (especially at NEC), less on graphics. As there are fewer entrepreneurs and free-lance professionals in Japan, the professional market has dragged behind that in the U.S. Since desktops are looked at as a consumer product, Matsushita, Casio, Sanyo, Toshiba, and others are expected to emerge as the leaders. Japan is also believed to have an edge in the development of flat screens.

• Peripherals. Unlike some in the U.S., Japan continues its commitment to bubble memory, so if the market emerges, it will be there. Optical disks: there are at least five Japanese vendors who understand everything necessary to manufacture, deliver, and support optical disks, and the expertise will continue to be driven by innovations in the consumer marketplace. Though not on a par with semiconductors, EDP/IR believes that it would be a serious mistake to cede leadership in the optical products market.

• Semiconductors. Government support of VLSI research is well known. This coupled with the financial resources of the Japanese chip vendors makes for strong competition for U.S. firms. In terms of dollar value, the U.S. now imports twice as many ICs from Japan as it exports to Japan. Recent work by the Japan Information Processing Development Center (JIPDEC) has said that by the 1990s, Japan expects to produce 10 million gates per chip semis.

• Architecture. Japan has shown little ability to make significant advances in computer architecture; almost all Japanese machines are patterned after American models. Similar lack of imagination has characterized its microprocessor efforts; only in the 4-bit, game-oriented arena is Japan expected to do a sizeable microprocessor business.

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• FRENCH NATIONALIZATION HAS MULTINATIONALS SHAKING. Unlike many elected officials it looks like the Mitterand government will stick to its campaign rhetoric. Prime Minister Mauroy has already announced that talks have begun with both Honeywell and ITT, although the spokesman was quick to add that the electronics industry is not likely to be nationalized as quickly as some others, and that the interests of foreign shareholders will be safeguarded.

Among the definite nationalization targets are CGE, Saint-Gobain, and Thompson Brandt, all at the parent company level. Presumably this would leave untouched such subsidiaries as Eurotechnique, a 51% Saint Gobain and 49% National Semiconductor venture. Also in possible danger is Matra Harris Semiconductors, 49% owned by Harris.

• BURROUGHS TO BUY NETWORKING KNOW-HOW. Burroughs looked in its own backyard and picked up Systems Research Inc., a Michigan-based supplier of communications processors, CRTs, and software for on-line data entry, file processing, and reporting. With 1980 revenues of $8 million, the company employs some 100 people, most of whom are said to be communications engineers. Pending approval, System Research -- and its key employees -- will become part of Burroughs's recently formed Communications Network Organization. Terms of the acquisition have not been released.

• IBM FAILS TO STOP EUROPEAN ANTITRUST CHALLENGE. The giant's attempt to delay a trial -- based on a claim that the charges against it are unclear, imprecise, and procedurally faulty -- was denied by the Court of Luxembourg. The charges include: bundling main memory into CPU prices; bundling operating systems and installation productivity options (recently changed); and not supplying interface information until the date of first delivery. The courts use large fines as the chief means of enforcement for non-European firms.

• PERTEC DUMPS U.S. DATA ENTRY BASE. Citing high interest rates, the data entry systems vendor has signed over its installed base of some 1,200 systems to Sperry Univac. Unspecified numbers of Pertec sales and maintenance staff are expected to make the jump also. The two firms have had OEM deals for seven years. Pertec will continue to sell in the end-user market in Europe and the move will not effect any of its OEM operations.

• IPL STEPS UNDER IBM PRICE UMBRELLA. Taking advantage of the giant's recent 5% purchase and 15% maintenance hikes on 4300s, IPL has made comparable moves. Prices for 4443s and 4446s went up 5% and maintenance has gone up 10%. IPL has recently entered the direct sales market in the U.S. Previously, it had sold most of its machines to Control Data; it also sells to Olivetti, which sells them in Europe. Watch for IPL to get into software.

• HP CHANGES MIND, SWAPS BUZZWORDS. Less than a year after its establishment, the Information Systems Division has been dismantled, with the pieces being put into a new Information Networks Division headed by former data communication head Andre Schwager.

• CORRECTION. On page two of Vol. 17, No. 5, a purchase price increase of 10% for IBM's Displaywriter was incorrectly reported. Only lease and rental prices were increased.

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EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"The Gray Sheet"

MOLLY UPTON, EDITOR JULY 10, 1981 ● VOL.17,NO.5 P.J. MCGOVERN,PUBLISHER

Burroughs and Wang show office plans -- Page 3

IBM SUMMERTIME PRICE INCREASES SHRIVEL 303X PURCHASE/LEASE RATIOS; SOFTWARE AND MAINTENANCE HIT HARD

Unlike most users, IBM watchers have come to look forward to the giant's semi-annual price increases. For them, all the bad news is merely grist for the mill, first-hand evidence of IBM's carrots, sticks, and intentions.

Among the usual rhetoric about inflation and the cost of doing business, IBM has thrown in a few quirks that do more than merely pad its coffers. Among those seen as significant by EDP/IR:

- A continual tightening of price/lease ratios on the 303X series. As the figure drops into the mid twenties, the "buy me" sign gets hard to ignore.

- Although IBM has made it clear it wants users to move to the newer releases of the MVS operating system, it has no intention of using low prices to entice them.

- Increases in software and maintenance expenditures, although not as across-the-board as the rental/lease increases, were generally double those of their hardware counterparts, making these components an ever-larger part of the revenue base.

This is now the fourth time since December 1979 that IBM has announced general price increases, and all the innocent looking 5% increases are adding up. A typical example is a 3880 controller which cost $62,350 in Dec. 1979, and now goes for $75,760, an increase of 22% in 19 months.

When the new rates go into effect (mostly on October 1) purchase/lease ratios on the 303X will tend to hover in the mid twenties. For a 3033U (including a 3036 console, and a 3037 power and coolant unit) the ratio is 25.2 months, compared with 40.2 on December 1, 1979. In other words, the rate has dropped 37.5% over this 19 month period, even though there has been only the December 1980 drop in purchase price. Although not as dramatic as the 3033U, the 3033N (with the same memory and accessories) has dropped from 34.2 to 25.2 over the same period, a shift of 26%. EDP/IR's calculations take monthly maintenance fees into account.

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Since the prime rate during the December 1979 price increases was a mere 10%, it is easy to attribute this eroding ratio to the high cost of today's money and the subsequent increases in the cost of financing large lease bases.

Nevertheless, EDP/IR thinks this is only part of the story; with the 3081 coming along by the end of the year, IBM wants to clear the decks of its 303Xs in a way that picks up revenues, which are suspected of running a little behind schedule this year.

There are no such "buy me" signs on the 4300s. Purchase prices on the 4331-1, 4341-1, and the 4341-2 went up 5%, compared to typical lease increases of 7%. Only the 4331-2 was spared, on both purchase and lease. More importantly, purchase/lease ratios on the 4300s remain in the 38 and 39 range, just a notch below the 40 ratio currently scheduled for the 3081.

For those who believe that the 3081 will unveil some significant enhancements and perhaps even a native operating system before it is actually delivered, the continual emphasis on selling off 303Xs is taken as confirmation. In other words, if IBM is going to significantly increase 3081 performance without affecting the price, or if it plans to introduce a new operating system, then it will try to minimize its lease base of 303Xs before their value is significantly eroded.

International Data Corporation, publisher of EDP/IR, thinks such improvements are in the works. If changes bring the 3081 into the price/performance range of the 4300s, the machine will have either twice the performance or two thirds the price, and no one is placing bets on the latter. The hefty purchase/lease ratios of 4300s probably indicate that any new 3081 features are not expected to impact 4300 values.

Software costs keep rising

Big ticket software items showed virtually an across-the-board 15% increase. Included are all MVS/SP releases, IMS/VS, and key features of the DOS/VSE, DPPX, and DPCX operating systems. Typical software configurations calculated by EDP/IR show that monthly software expenditures can easily exceed $8,000 for machines with significant database work, a figure creeping up toward 10% of the total monthly system rental or lease costs for 3033 systems. The percentage of operating costs consumed by software rises steadily as the hardware gets smaller; its about 25% of the bill for 3031s and equivalent size machines.

At GSD and OPD

On the average, prices at the General Systems Division and the Office Products Division went up 8% and 10%, respectively. Among the interesting wrinkles at GSD are revised discount schedules for the Series 1, 5520, and 5280 systems. The value-added procurement method for the three machines was favorably adjusted so that buyers of 5 to 19 systems will get a 10% discount; 20 to 49 systems, a 15% discount; and 50 or more systems, a 20% discount. Additionally, the Value-Added Remarket plan, available only on the Series 1 was changed so that buyers of from 1 to 4 systems will get a 15% discount, up from the original 10% figure. The biggest news at OPD was the 10% purchase and 15% rent and lease hike for the Displaywriter, this in the face of Xerox's low-cost 820 and Wang's recent price cuts on its Wangwriter.

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WANG AND BURROUGHS UNVEIL OFFICE AUTOMATION STRATEGIES, LAY DOWN THE WELCOME MATS FOR IBM AND OTHER VENDORS' HARDWARE

To accept or not to accept? ... The question of whether to put up the "keep out" signs, or take a more communal hardware view has been answered twice in recent weeks. Both Burroughs and Wang have opted for heterogeneous office environments, providing "easy access" for a wide variety of equipment. Especially noteworthy are both vendors' promises to provide gateways and compatibility for IBM SNA and 3270 environments by 1982.

For Burroughs, the Ofis 1 system may have come just in time. After several years of spinning its wheels, the Detroit mainframer has finally got its office machines out of the garage ... just as the door of opportunity threatened to be shut. Integrated hardware concepts, a new text retrieval system, and a "welcome all" approach will try to lift the company's sagging office image. Highlights of the announcement include:

- A standalone text storage/retrieval system (the Ofisfile) capable of accepting OCR input and both Burroughs and non-Burroughs terminals. It comes with modular storage blocks and a relatively low price tag. Its easy-to-use software allows the system to search for any word(s) the user might enter.

- A communications processor that can link multiple text files from the above-mentioned file system to either Ethernet networks or IBM hosts. Burroughs also said it plans to have its own local network.

(In a separate but related move, the company also announced a multi-year agreement with Fujitsu Ltd., allowing Burroughs to market the latter's 35 second, white-space-skipping analog facsimile unit, purported to be one of the fastest on the market.)

Wang's move comes from a different perspective. The self-professed giant killer has racked up an impressive share of nearly 50% in the clustered word processing arena. But until now it hadn't come up with its own networking plans, and its ability to meet the processing needs of large organizations has been limited by its concentration on word processing machines.

Its response is Wangnet, a broadband coax scheme, whose philosophy seems to be, "if we control the arteries, then we control the patient." The Wangnet has lots of capacity. Could IBM perhaps be interested in this scheme via its patent exchange agreement? EDP/IR has seen no consistency in IBM's nets.

Wang's approach includes the following three-tiered offerings:

- 12 Mbit/sec fixed-frequency transmissions for Wang-to-Wang communications, for users of the company's larger VS, OIS, and 2200 systems.

- 64K- and 9,600 bit/sec transmission rates between Wang and non-Wang equipment in a frequency multiplexed environment.

- Seven, 6 MHZ video allocations for teleconferencing, security, graphics, and video image transmissions.

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In a separate announcement, Wang also introduced a standalone voice store-and-forward system for both internal and external communications. The system does not need a PBX, and is available to anyone using Bell's Touchtone phones.

Burroughs steps to the fore in electronic filing

Back in January when new CEO Michael Blumenthal was trying to play down some unaccustomed red ink, he stressed that Burroughs would place increasing emphasis on applications software and on Burroughs' traditional strength in computer architecture.

Burroughs' new office file system (labeled Ofisfile) fits this description, and Blumenthal himself was on hand for the introduction. The machine is a specialized standalone or communicating electronic text retrieval system, which can use a combination of Burroughs Ofis 1 display stations (Redactron), Ascii terminals, and terminals made by "most word processing vendors." It will also take Wang and other vendors' floppies, facilitating cooperation with many existing WP systems.

The Ofisfile supports up to eight access ports and comes with either 80 or 160 megabytes of storage. (At 1,500 characters per page, this translates to 40,000 pages for the former, 80,000 for the latter.) All this in the physical space of a two-drawer file cabinet.

The marketing emphasis will be on the ease of use and the attractive price tag. The 80 Mbyte version goes for $59,400 ($1,916 per month on a three-year lease); the 160 Mbyte machine costs $79,200. After seeing the machine in action, EDP/IR dubbed it the "any word access" system. A name, word, date, or phrase is all that is necessary for the search procedures. Basically, algorithms condense the text for fast scanning; but the full text is available when the document is retrieved.

A boost for OCR input

The Ofisfile may finally allow the office products people at Burroughs to get some mileage out of their optical character recognition technology. Though its market penetration remains shallow, OCR still looms as a potential first-rate method for getting paper materials -- reports, memos, forms, etc. -- into a text management system.

Burroughs' intention to accept non-Burroughs hardware modules might be extended to OCR devices. The most logical choice would be Kurzweil's omni-font device. There were no new OCR units announced. Burroughs Ofisreaders can recognize four major fonts -- Courier, Elite, Letter Gothic, and OCR-B -- at 20 seconds per page. (For the those who like arithmetic, at three pages per minute, 80,000 pages could be loaded in 444 hours, or 56 eight-hour days.) Results are displayed on a CRT for operator verification. The machine costs $10,900 ($675/month on three-year lease.)

Communications

Burroughs' compatibility efforts do not stop at its willingness to swap terminals or accept floppies. The new Ofisdirector communications processor enables other system components -- including the Ofisfile and Ofisreader -- to talk to each other or to Burroughs and IBM CPUS, including SNA, 3270, and RJE.

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The Ofisdirector also handles electronic mail, and personal touches such as tickler files. There are two models. A model with four internal processors, 360K main memory, 19 Mbytes disk, 1 Mbyte floppy, and two communications lines, goes for $33,500 ($1,000/month on a three-year lease). With six internal processors, 753K main memory, 77 Mbytes disk, 1M floppy, and 12 communications lines, the price is $60,000 ($2,000/month on a three-year lease).

Burroughs believes that having integrated its previous products -- only the Ofisfile is really new -- it will be in the position to offer a wide variety of software enhancements. Expected to be announced soon are host computer software for information management, business planning, modeling, statistical analysis, information sharing, and communications; all of these will be available to properly configured Ofis 1 users. Is there any doubt that word and data processing are starting to mesh?

Wang's three-tiered broadband approach

In the technological battle of the bands -- i.e., baseband and broadband -- give a round to the latter. As the first major vendor to endorse the broadband approach and go against the mighty Xerox, DEC, Intel triad, Wang VIPs were eager to take shots at baseband, and by implication its chief proponents.

The best thing about broadband is its capacity. According to Wang, users taking advantage of all announced capabilities will be using only about 35% of the available bandwidth -- the entire 251 MHZ to 350 MHZ range remains untouched, leaving plenty of room for new services and equipment.

The Wangnet is more than just a frequency multiplexed broadband bus. The "Wangband" portion handles transmissions between Wang's VS, OIS, and 2200 systems via a baseband-like, single fixed frequency stream flowing at 12 Mbit/sec (20% faster than Ethernet). Wang hardware connects to the bus through Z-80 based $3,800 Cable Interface Units (CIUs), each with 128K of memory. The CIU packetizes data for transmission down the bus; it also receives, buffers, and disassembles received packets. The CIUs will be available in the fall of 1982.

The Wangband portion, like Ethernet, uses a Carrier Sense Multiple Access/Collision Detection (CSMA/CD) system. Wang boasts superiority because its CSMA/CD system cancels the damaged data, and then staggers the retransmissions, giving "complete error recovery and flow control."

The Wangband will also be able to: use Wang's Mailway between the OIS, VS, and 2200 systems; perform VS data processing tasks from any suitably equipped Wang workstation; edit documents on different systems; and initiate transfers to and from other systems.

Wang to non-Wang equipment

Practically anything with an RS 232 or RS 449 port can be funneled into Wangnet's protocol-transparent, full duplex "Interconnect band." Because this band uses frequency multiplexing, there are no Ethernet-like collisions. By July 1982, Wangnet will be able to connect to SNA, X.25, 3270, 2780, and TTY systems, with the interfaces handled at the individual system level.

Non-Wang gear hooks to the bus through Wang Dataswitches and Wang Frequency Agile Modems (also called RF modems). Each system -- not each terminal --

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WangNet Characteristics

Band	Frequency Allocations	User Connection Requirements	Channel/Band Characteristics	Control Methods	Data Rates	Wang Hardware Required
Interconnect	10 to 12 MHz (32 dedicated channels)	RS-232-C from user device to modem	Full-duplex, transparent, dedicated channels for multipoint or point-to-point communications	Fixed channel assignments with no master control over channels	Up to 9600 bps	One crystal-controlled, Fixed-Frequency Modem per user-device communications port
	12 to 22 MHz (16 dedicated channels)	RS-449 from user device to modem	Full-duplex, transparent dedicated channels for multipoint or point-to-point communications	Fixed channel assignments with no master control over channels	Up to 64,000 bps	One crystal-controlled, Fixed-Frequency Modem per user-device communications port
	22 to 48 MHz	RESERVED FREQUENCIES				
Interconnect	48 to 82 MHz (256 channels)	RS-232-C from user device to Frequency Agile Modem; RS-366 for autodial	Full-duplex, transparent channels for switched point-to-point communications	Frequency Agile Modems with a DataSwitch assigning channels for each session	Up to 9600 bps	One Frequency Agile Modem per user-device communications port, plus one Wang DataSwitch per WangNet system
	82 to 174 MHz	RESERVED FREQUENCIES				
Utility	174 to 216 MHz (seven 6-MHz channel allocations)	Type F 75-ohm, dual-captive, manually terminating plug from video equipment to user outlet	Standard CATV video channels	N/A	N/A	None
Wang	217 to 251 MHz (contention for approx. 65,535 Wang VS, OIS, and 2200 systems)	RG-59/U 75-ohm BNC/TNC dual-coaxial connection from Wang serial I/O controller to CIU	Virtual circuits	Carrier-Sense Multiple-Access with Collision-Detection (CSMA/CD); binary-exponential backoff	12 Mbps (fixed)	One CIU per Wang system
	251 to 350 MHz	RESERVED FREQUENCIES				

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requires the modem ($850 for the 9,600 bit/sec model, $1,200 for the 64K bit/sec model). All system modems are designed and made by Wang.

Wang says on a per terminal basis its CIUs are cheaper than Xerox's attachment charges, and its modems for the interconnect portion are comparable to Xerox's $1,100 connection price.

When a request for transmission is made, the Dataswitch checks to see if the desired system is available, and if it is, it notifies both systems' modems as to what frequency they should use. A single $12,000 Dataswitch monitors all traffic, although reliability requirements may demand multiple switches. The Dataswitch also controls all communications to non-Wangnet destinations.

(It is the interconnect band that puts the limitations on the cable length. The distance from the Dataswitch to any network outlet should not exceed two cable miles, although Wang says that adjustments can be made where necessary.)

Wang expects big things from video, especially teleconferencing, graphics, and security applications. As with cable TV, Wangnet can send either freeze-frame or full motion video signals. The seven, 6 MHZ "utility" channels require no Wang hardware; users supply their own gear. (A bandwidth of 6 MHZ is the industry standard for television transmission.)

Wang is not the only purveyor of broadband nets. Amdax's "Cablenet" is noteworthy because it is compatible with IBM's SNA, and boasts of data speeds of 14 Mbit/sec, protocol transparency, and full or half duplex transmission, with 92% of the bandwidth available for video and/or voice applications.)

Wang also introduces voice store and forward

As part of its push to be more than just a word processing company, Wang is hitting the office market with a new voice store-and-forward system designed to cut back on telephone tag.

The standalone system does not now connect with Wangnet and does not require a PBX. Labeled the DVX (Digital Voice Exchange), the system receives voice input, digitizes it, then either sends it to, or stores it for, the recipient. The message can be up to 90 seconds in duration, and the user can specify the time of delivery for up to 31 days ahead of schedule. The system will make five attempts to get through for immediate delivery. Any message can be sent to up to eight distribution lists, each containing up to 32 destinations, ideal for easy memo sending.

Messages not delivered immediately can be stored in the "audio mailbox." The obvious shortcoming is that one never knows when a message is lying in wait. (Perhaps the single line display phones being made by Northern Telecom will eventually fill this gap.) The system can also connect to remote users.

Hardware and prices for the DVX

DVX can come with from four and 16 telephone lines. Wang estimates that this will allow it to serve between 200 and 800 users. The basic system, which includes the digitizer, CPU, a 10 Mbyte system disk, 275 Mbyte message disk, a control terminal, and printer, lists for $125,000. Shipments will begin in the first quarter of 1982.

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• PRIME CEO HAS HAD ENOUGH. Ken Fisher, Prime's president and CEO for the last six years, has resigned to pursue interests of a "non-business nature." Wall Street gives Fisher a lot of credit for Prime's consistently stellar performance, and, accordingly, Prime's stock dropped more than six points the day of the announcement. Word has it Board Chairman David Dunn was unhappy with both Fisher's handling of the departure of the team that formed Apollo Computer and with the lateness of the 850. Prime tightened its belt during the first quarter in order to get its earnings growth on the projected track.

• INTEL GETS SECOND SOURCE -- IN CMOS. Intel has been needing a U.S. second source for its CPU line since many makers have lined up with Motorola to produce an impressive array of devices. As part of a joint design effort, Harris will make CMOS versions of Intel's 8- and 16-bit N-channel microprocessor and peripheral designs -- including the 8086 and 8088. Intel expects the low power consumption CMOS circuits to be one of the fastest growing areas of semiconductor industry. Both companies will have manufacturing and marketing rights to the resulting products. Harris also retains the right to license any of the results to Matra-Harris, its joint effort with the French terminal maker. (Matra is one of the firms expected to supply vast quantities of low-cost terminals in the upcoming French home terminal projects; it has also recently agreed to supply 100,000 terminals to Tymshare.)

• STC PICKS UP EXXON OPTICAL DISK UNIT. Pieces of the Exxon Enterprises' office automation jigsaw puzzle are starting to fall off the table. Amid rumors that all is far from well, Exxon has sold its Star Systems Division to STC for an undisclosed amount of cash. STC will move Pasadena-based Star, which has been working on optical disk technology since 1978, to its headquarters in Louisville, Colorado, in conjunction with with STC's 75-person optical products operation.

• FAIRCHILD WINS ROUND ONE WITH DATA GENERAL. After Data General had settled several suits on the same subject, Fairchild managed to win its antitrust charge that DG inhibited others' business by using its economic clout in the mini market. The nub of the gripe alleged DG tied in sales of its operating system to its Nova systems. DG plans to appeal, pending the resolution of the damages trial, slated to start October 5. DG has also filed trade secret charges against Fairchild and Digidyne.

• BURROUGHS, DG ADD IBM MANAGEMENT MUSCLE. Each has lured three high ranking former IBMers to its ranks to add cement to its new structure. At Burroughs, Dr. Paul G. Stern is vp of engineering, manufacturing, (from 1968-76 he was a senior IBMer including manager of IC processes and products in the Components Division); Philip Dauber is senior vp technical operations (IBM director of organization and secretary of the corporate management committee). The most recent recruit is Robert F. Holmes, president of Burroughs International Group (vp Americas of IBM World Trade Americas Far East).

DG's Herb Richman grabbed Frank P. Silkman to be senior vp responsible for the three new business divisions (assistant to president of Information Systems Division); Robert C. Miller is senior vp for technology and reports to de Castro (director of Boulder labs for IBM's General Business Group). And David L. Chapman was named vp U.S. manufacturing (an IBM director of manufacturing).

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REVIEW & FORECAST
Part II

"The Gray Sheet"

EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

MOLLY UPTON, EDITOR JUNE 26, 1981 ● VOL.17,NO.3,4 P.J.McGOVERN,PUBLISHER

1981 ANOTHER BANNER YEAR FOR UNIT SHIPMENTS; DOLLAR VALUES WILL CLIMB 17.6% TO $31.5 BILLION

True to form, the recession appears to have had little impact on the overall healthy growth of the computer industry in 1980 and International Data Corp., publisher of EDP/IR, intrepidly predicts another banner year in 1981.

Last year, U.S.-based manufacturers racked up a 45% growth in worldwide unit shipments to 689,445 compared with 1979 while sustaining a 16% increase in the value of shipments. Much of the action came at the low end of certain segments, most notably smaller general purpose systems and microminis.

For 1981, the number of systems shipped should exceed 900,000, growing 32.4%, while the value of shipments will climb 17.6% to $31.5 billion. And although there will be minor soft spots along the way, the overall picture shows shipment values doubling between 1980 and 1985, from just under $27 billion to $56.6 billion. Propelling this phenomenon is a combination of several factors such as: the quest for productivity; the lure of price elasticity; and the fact that use is moving into everyman's grasp.

IBM PROCESSING POWER INSTALLED -- U.S.
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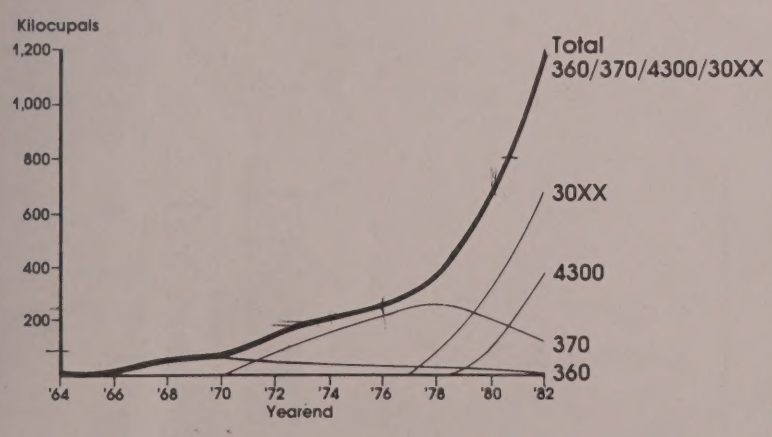

Thanks to technology as well as demand, in the next two years alone installed power will grow almost as much as it did in the past 16 years.

This chart depicts IBM's installed base, which at 60+% of the market, is a good indicator. IDC coined the term cupal to represent a power rating of one, which is equivalent to the power of a 360/20. The number of cupals installed is derived by multiplying the cupal ratings of particular models by the number installed.

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VALUE OF WORLDWIDE SHIPMENTS OF
U.S. MANUFACTURERS 1980-1985
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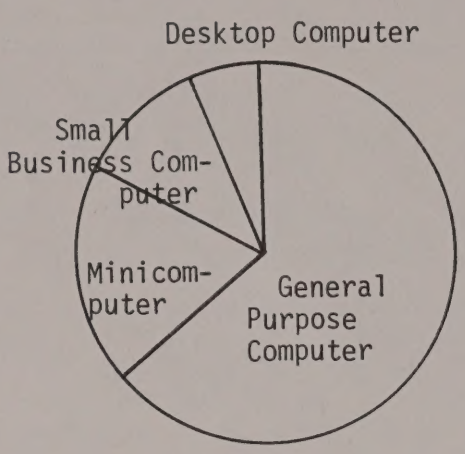
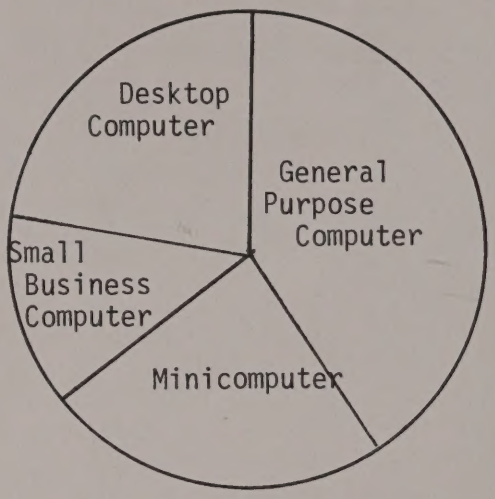


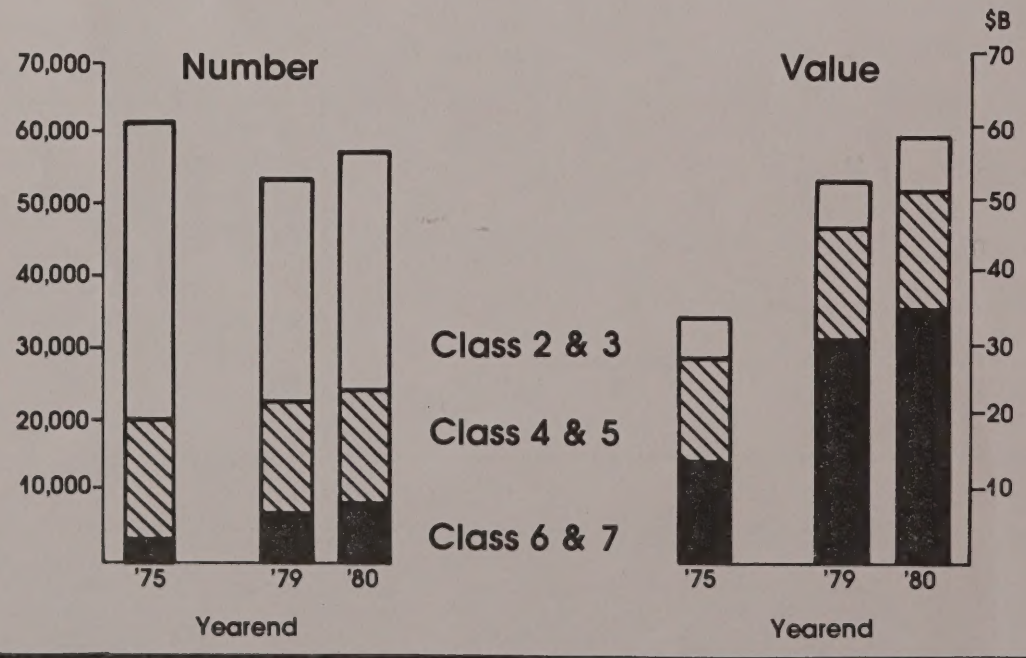
$26,794 Million
1980



$56,640 Million
1985

International Data Corp. sees the compound growth rate for worldwide shipments of U.S.-based makers rolling along at 28% for the 1980-1985 period, while the value of shipments should grow at nearly 17% compounded. Because of differences in growth rates, the revenue pie will be sliced quite differently in 1985 from 1980 as the desktop commandoes garner a larger slice at the expense of general purpose.

INSTALLED BASE BY SIZE CLASS
UNITED STATES
(Copyright 1981 - International Data Corporation)



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Desktops will post the highest five-year compound growth rate in value of shipments, 49.2%; minis and small business computers are neck and neck at 21.9% and 20.2%, with general purpose lumbering along at about 6.1%.

Last year was a solid one for the mainframe segment. During 1980, the number of general purpose units shipped was more than double, exceeding IDC's year-ago forecast, and revenue growth was also greater than predicted. Mini shipments, buoyed by supermini shipments and Digital Equipment's activity in the micromini arena, also exceeded expectations by growing nearly 22%, although revenue growth was close to target at almost 23%.

Mainframes robust

Thanks to IBM's shipments of its System/38 and 4331, size classes two and three collectively showed their first growth in the size of the installed U.S. base since 1975. On the international front, Honeywell Level 61s and 62s joined the IBM S/38 and 4331 in the small mainframe comeback. In the mid-range, shipments of the 4300s were greater than anticipated, reflecting the migration of 370 users.

By contrast, shipments of the high end 3033 were less than anticipated. There are several possible explanations, including high interest rates, anticipation of the 3081, and an extended delivery schedule. The latter factor was probably caused by converting production lines over to the 3081; shipments were less than in 1979 so the cause wasn't high volume shipments. But the delayed delivery schedule could have been engineered by IBM to induce users to wait until the 3081 was announced. However, on an overall dollar basis, the 3033 shortfall was offset by the combination of high 4300 shipments as well as S/38s and IBM's worldwide shipment value rose by a healthy 12%.

WORLDWIDE GENERAL-PURPOSE NEW-BUILD COMPUTER SHIPMENTS
FOR U.S.-BASED MANUFACTURERS
(Copyright 1981 - International Data Corporation)

	1980			1979			1978	
	$M	% Total	%Δ	$M	% Total	%Δ	$M	% Total
IBM	10,650	62.4	11.5	9,550	62.5	(3)	9,845	67.5
Amdahl	380	2.2	4.1	365	2.4	15.8	315	2.1
NAS	190	1.1	5.6	180	1.1	--	--	--
Itel	--	--	--	--	--	--	350	2.4
Magnuson	35	.2	133.0	15	--	--	--	--
IPL	10	.1	--	--	--	--	--	--
PCM Peripherals	700	4.1	9.4	640	4.1	(8.6)	700	4.8
Subtotal PCM	1,315	7.7	9.6	1,200	7.5	87.9	1,365	9.4
TOTAL IBM BASE	11,965	70.1	11.3	10,750	70.1	95.9	11,210	76.8
HIS (+Xerox)	1,550	9.1	0	1,550	10.2	76.1	880	6.1
Sperry Univac	1,410	8.3	8.5	1,300	8.5	38.3	940	6.4
Burroughs	1,000	5.9	17.6	850	5.6	13.3	750	5.1
NCR	480	2.8	23.1	390	2.6	21.8	320	2.2
CDC	400	2.3	66.6	240	1.6	(20.0)	300	2.1
DEC	205	1.2	36.6	150	1.1	0	150	1.0
Cray	50	.3	--	--	--	--	--	--
Others	--	--	--	45	.3	12.5	40	.3
Non-IBM Base	5,095	29.9	12.6	4,525	29.9	33.9	3,380	23.2
TOTAL	17,060	100.0	11.7	15,275	100.0	4.7	14,590	100.0

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INFORMATION PROCESSING REVENUES -- LEADING MANUFACTURERS
(Millions of Dollars)
(Copyright 1981 -- International Data Corporation)

	1975	1976	1977	1978	1979	1980
IBM	11,850	13,400	14,765	17,074	18,338	21,367
NCR	1,415	1,674	1,944	2,240	2,634	2,951
CDC	1,246	1,358	1,513	1,868	2,273	2,791
Univac (3/31)	1,433	1,467	1,726	2,050	2,319	2,707
Burroughs	1,457	1,612	1,794	2,083	2,376	2,413
DEC (6/30)	534	736	1,059	1,437	1,804	2,368
HIS	856	914	1,037	1,294	1,453	1,634
HP (10/31)	399	461	588	769	1,092	1,546
TOTAL	19,190	21,622	24,426	28,815	32,289	37,770
IBM %	61.7	61.9	60.4	59.3	56.8	56.6

As can be seen by the above table, the mainframe species seems to have sustained its life rather well. Most of the above vendors derive a big part of their revenues from the mainframe market and all have grown at better than 10% over the past five years -- most of them much better than 10%. Some of Burroughs' softness in 1980 was attributable to non-mainframe areas.

Some notable trends perpetrated by mainframers as well as others in the industry are:

- Tendency toward purchase.
- Faster introduction of new technologies.
- Unbundling of software revenues.

Minicomputer makers are increasingly mounting attacks on the general purpose domain, primarily with superminis, whose shipments grew a hefty 42% in 1980 to 25,700 units. Indeed, the 1980-1985 supermini's compound growth rate should be 20.8% for unit shipments and 26.3% for the value of shipments. A couple of reasons for the high growth in this sector during 1980 are the availability of systems oriented toward commercial use -- the VAX and DG's MV/8000 got Cobol -- and growth in the distributed processing segment of the market. In addition, there seemed to be some pent-up demand among users who needed interactive machines.

The traditional mini market was a different story. Shipments in 1980 were less than in 1979, down 5.9% to 63,300. This segment of the industry should remain nearly flat through 1985, undoubtedly in part a victim of the micromini and the small business computer.

The micromini, fueled by DEC's efforts in the LSI family, soared beyond IDC's projections, reaching a 59% growth in shipments during 1980. The total

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1980 WORLDWIDE VALUE OF MINICOMPUTER SHIPMENTS
OF U.S. MANUFACTURERS
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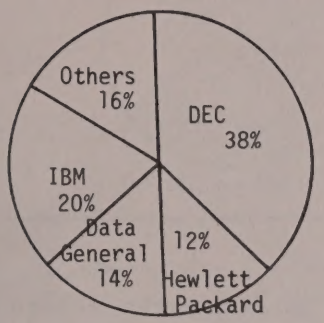
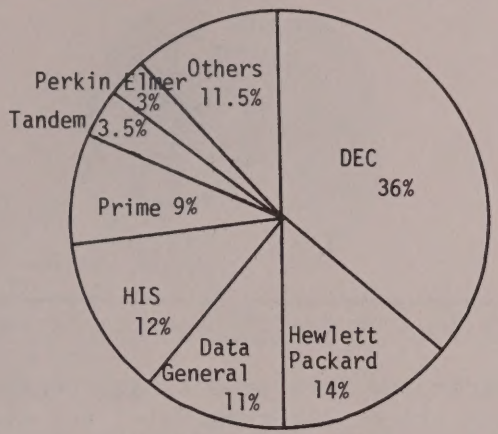


$1,409.3 Million
Traditional Minis



$2,968.7 Million
Superminis

industry shipments were 61,139 units, of which DEC accounted for 51,000. Most of these wended their way overseas last year as OEM channels closed up in the U.S. IDC anticipates micromini business will return to the U.S. next year as the recession fades.

One hint at the changes in the revenue bases may be glimpsed by examining the minicomputer vendors. IDC estimates that in 1980, they received over 16% of their revenues from service and about 5% from software. By 1985, this picture will have changed to reflect 21% from service and 10% from software.

1980 WORLDWIDE MINICOMPUTER MARKET ACTIVITY
(Copyright 1981 - International Data Corporation)

	$M Revenues			Units Shipped		
	1979 Revenue ($M)	1980 Revenue ($M)	% Share	1979 Units Shipped	1980 Units Shipped	% Share
Digital Equipment	1,850	2,447	38	55,000	73,800	4
Hewlett-Packard	750	1,010	16	9,300	9,295	6
Data General	540	672	11	15,750	19,850	13
HIS	290	425	7	3,125	4,900	3
IBM	240	350	6	7,000	8,600	6
Prime	153	268	4	1,028	2,000	1
Texas Instruments	200	243	4	7,380	8,450	6
Perkin Elmer	134	186	3	1,768	2,021	1
General Automation	125	155	2	4,319	4,573	3
Tandem	66	129	2	465	748	1
SEL	71	89	1	450	410	*
Sperry Univac	68	84	1	1,224	1,117	1
ModComp	72	81	1	501	410	*
Computer Automation	68	81	1	6,547	6,464	5
Harris	53	76	1	244	500	*
Others	300	134	2	7,899	7,684	5
TOTAL	4,980	6,430	100%	122,000	150,822	100%

*Less Than .05%

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U.S. DDP PRODUCT MIX -- DOLLARS SHIPPED
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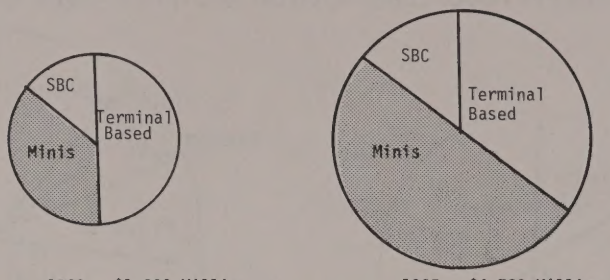

1980 - $1,232 Million

1985 - $4,789 Million

Minis to lead in distributed processing

Distributed data processing (DDP) is one of the markets into which minis, clustered processing terminals, and even small business computers and desktops are flowing. This arena should show a 30% compound growth in the value of shipments between 1980 and 1985 -- from $1,232 million to $4,788 million. The value of the installed base will grow even faster, 40% compounded, prompted by increased availability of communications capabilities that will enable users to utilize installed products in DDP applications.

Distributed data processing has emerged from a buzzword to a reality, but there are still numerous definitions. IDC cites five characteristics of a DDP system: local decentralized processing power for the end user; networking capability; common applications run at several sites; use of small processors for local processing; and report generating ability from locally stored and retrievable data.

Minis will play a growing role in DDP. Nearly 10% of all mini shipments during 1980 were to DDP environments and by 1985 this figure should be 19%, according to IDC. By 1985, shipments of minis to DDP will have outnumbered shipments of clustered processing terminals, once considered the major vehicle for DDP. Clustered processing terminals include IBM's 8100 and product lines of Datapoint and Four-Phase. The major portion of clustered processing terminal shipments will continue to be to the DDP market, from 78% of all shipments in 1980 to 90% in 1981.

DDP PRODUCT SHIPMENTS, U.S. MARKET, 1980 - 1985
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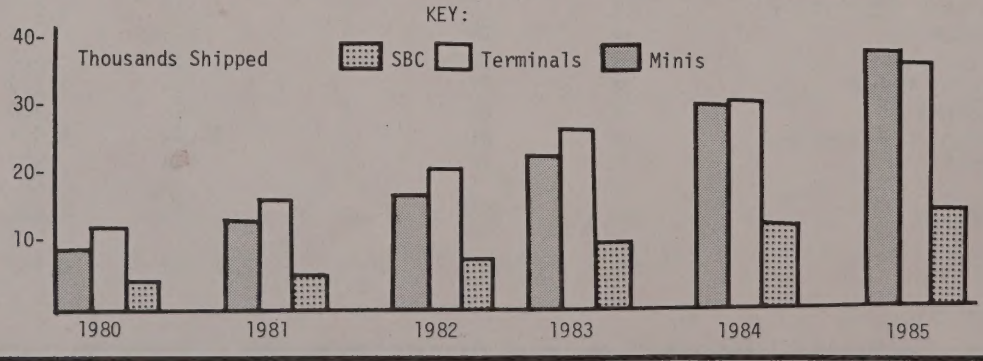

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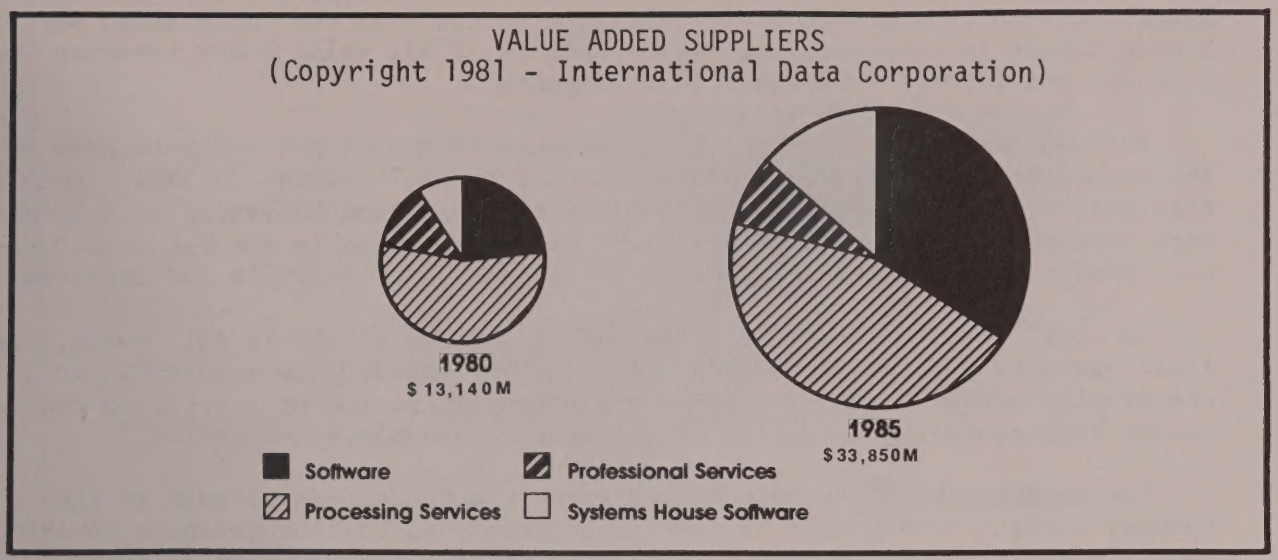

Software leads value added growth

Software is still the star among the value added supplier sectors of the market, which include software from hardware makers, systems houses' and independent packages, as well as processing and professional services. Overall, the worldwide revenues of U.S. value added suppliers should grow at a 21% compound rate, from $13.1 billion in 1980 to almost $33.9 billion in 1985.

Among the trends driving the value added supplier market are:

- User friendliness -- both in software per se and services;
- Acquisitions of services companies, often entailing
- Outside influence and impetus;
- Niche hunting.

The torrid pace of acquisitions both within and without the industry continues as medium to large size companies expand their grasp by buying up smaller, often batch shops, while at the same time often finding themselves acquisition targets from outside firms.

One of the common threads that seems to run through many of the outsider acquisitions is that the buyers are basically in the communications business. For instance, there is no dearth of publishers seeking to get their feet wet in on-line publishing by acquiring expertise and facilities from services firms. Readers Digest bought The Source, for instance.

Software, packages are hot

A 30% compound growth rate is forecast for revenues of the software sectors. These revenues will jump from a healthy $4.2 billion in 1980 to a whopping $15.5 billion in 1985.

The software sectors' piece of the value added suppliers' pie will grow from 32% to 46%. EDP/IR suspects this actual percentage is low as it doesn't reflect the revenues accrued from software by the processing providers.

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Revenues of packaged software from hardware manufacturers and independents should grow almost 34% compounded from 1980 to 1985 to $9.8 billion, making it clearly the hottest growth area. Packaged software is the value added market growth leader in revenues, accounting for 27% of all value added revenues in 1980 and growing to a 42% share in five years.

Hardware makers should see their revenues from packaged software grow at 39% compounded annually -- up nearly sixfold to $5.7 billion in 1985. Much of this growth reflects the unbundling trend that has been happening at a breakneck pace over the past three years and should continue in the future as vendors seek a greater percentage of their revenues from software and services.

In fact, with the era of the "nameplate" system almost in full swing, the field upgrades just don't provide the long-term steady income needed. Increasingly, hardware vendors simply are adding microcode or installing boards rather than replacing an entire CPU; thus the "nameplate generation."

The importance of the role of software to a vendor can be seen in the turnkey market; nearly half of its approximately $1 billion revenues in 1980 was generated from software and software support. Turnkey vendors supply hardware and software as solutions to particular tasks or industries. As such, the turnkey vendors are functioning as a distribution channel for packaged software. Thus, hardware is becoming a delivery mechanism for software.

Within the independent packaged software submarket, applications and utilities offerings are the fast runners, tied for a 29% compound rate, with applications maintaining its head start for a larger piece of the pie. Utilities will assume a larger role in user friendly systems as data management tools designed for the DP-inexperienced become more widely available both as software packages and as services offerings. Hence they might be considered the lynchpin behind the mood to increase use of computers.

Ease of use key to services, too

The processing services figures show that batch will not fade away anytime soon, although its growth is down to a pokey 6% compounded. Batch will be surpassed by remote problem solving revenues in 1982.

IDC has raised its growth estimates of remote problem solving services, which, along with remote transaction processing, should grow 21% over the five years. In this latter sector the supplier provides canned application software solutions for which users pay according to transaction volume and data base inquiry application solutions.

Remote problem solving, by contrast, involves the use of software tools. Remote problem solving should increase from almost 31% of the processing services pie to 37% in 1985. Remote problem solving services include plain vanilla time-sharing as well as application software tools -- such as query languages, data base management systems, financial planning, and decision support systems -- that permit the manipulation of data, some of which is usually user-generated.

Remote problem solving services are becoming increasingly business oriented and user friendly (their previous target was technical experts) by giving end users tools such as modeling, simulation, and data base management.

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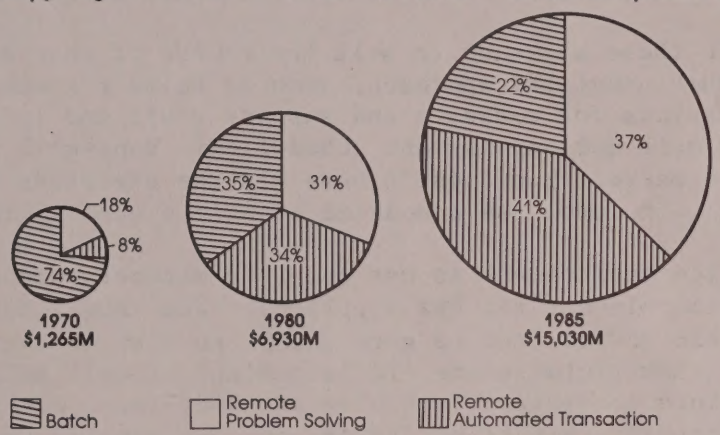
PROCESSING SERVICES BY ACCESS METHOD AND APPLICATION FUNCTION
(Copyright 1981 -- International Data Corporation)

	Batch	Remote Batch	Interactive
Transaction Processing (Solutions)	Payroll Processing Accounts Receivable	Material Requirements Planning Claims Processing	Invoicing Electronic Funds Transfer
Data Base Inquiry (Retrieval)	Business Credit Checking	Multiple Listing Services Library Cataloging Services	Stock Quotations Credit Card Authorization
Problem Solving (Tools)	Raw Computer Time Scientific/ Engineering Applications	Raw Computer Time Scientific/ Engineering Applications	Raw Computer Time Financial Modeling

Batch Remote Problem Solving Remote Automated Transaction

CHANGING SEGMENTATION OF THE PROCESSING SERVICES MARKETPLACE 1970-1985
(Copyright 1981 -- International Data Corporation)



Fight commences for office

One of the more interesting skirmishes involving industry participants is occurring in what was once considered an outpost: the office. With the realization that the world does not begin and end with functions provided by the "data processing" establishment, computer companies weekly are leaping on the "information processing" bandwagon. Part of the price of entry is endowing users with text processing capabilities with an ease of use that formerly was the preserve of companies that offered dedicated word processors.

The office game can be played at several different levels, and some vendors are preparing their positions on multiple fronts. The overriding question is what variety of capabilities do users want integrated into an easy to use system. How to integrate these capabilities is the challenge -- and IBM is in the same quandary as all the rest of the folks.

At the standalone level, the trend is definitely toward hybrid systems, or those that offer both word processing and data processing capabilities.

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Hybrid capabilities are now common and can be found on any system that runs CP/M, thanks to some relatively primitive WP packages that run under that operation system. Participants in this game range from desktoppers such as Northstar to heavies such as Xerox with its 820 "Worm" desktop and Wang, whose Wangwriter will acquire CP/M capability. And there are others such as Datapoint and Four-Phase that added WP to their systems. And when is IBM going to tap the power of the 8086 imbedded in its Displaywriter?

Text processing software is getting fairly sophisticated -- there are spelling packages ranging from detecting to correcting odd spellings and dictionaries that can be amended by the user.

A minimal requirement is that data and text files be compatible and transferrable from one sector of the system to the other. While this sounds obvious, it represents a significant challenge to some vendors that have gone outside to purchase WP software and slapped it on as an adjunct.

Then there are the shared resource folks. These systems can be either strictly WP or hybrid and generally share at least printers and disks; some, like Wang, have scattered many of the electronics pertaining to screen response time out into the workstations (formerly known as terminals).

And for those who want to sell their CPUs of supermini size or bigger, there is the integrated approach, such as Prime's system that provides different workstations for managers and support staff and includes such functions as electronic mail and appointment scheduling. Honeywell is attempting to make a bid in this market, but doesn't have all the executive functions such as scheduling. It, too, has announced a small system called (Info)writer.

An office environment is not complete without communications, and it is too early to rule out the PBX suppliers. Who knows what lurks in the heart of AT&T's Archie McGill once he gets the OK to play in nonregulated arenas? First PBX, then picturephone (it is coming), then? Rolm has an OEM agreement to manufacture Convergent Technologies' 8086-based workstations. Datapoint announced its ISX that links its Arc systems with its own PBX. And for those who like cable of whatever ilk, witness the local network battle between Ethernet advocates and others. Wang just introduced a broadband cable system and other vendors are hinting they too will offer local net capability.

• Inflation -- The value of computer system shipments shown in the Review and Forecast pages (Red) represents the price of equipment at the time of sale, i.e., the shipment values are in "current" dollars. Any inflation is included in the values shown. Computer system prices have, in fact, decreased over time for a given amount of computing power, and can thus be considered to have been deflationary rather than inflationary. But inflation has taken its toll by lessening the amount of price decreases. IDC expects the effects of inflation as measured by the GNP implicit price deflator to be about the same over the next five years as in the past five years, about 7% a year.

• Note -- The "Number in Use" column accounts -- in aggregate -- for retirements. In the minicomputer summary, this column also includes "transshipments," i.e., those computers which are originally shipped to a U.S. location but eventually are installed outside the U.S. The "Value in Use" column represents the if-sold value at the time of shipment.

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COMPUTER MARKET SUMMARY
(U.S.-Based Manufacturers)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1975	75,600	329,440	$ 12,255	$ 67.1
1976	101,140	407,630	13,332	76.7
1977	161,970	545,060	16,133	89.3
1978	312,120	837,640	19,808	104.8
1979	473,580	1,278,220	23,013	120.9
1980	689,445	1,929,965	26,794	141.4
1981	913,045	2,798,210	31,515	165.1
1982	1,190,955	3,938,465	36,583	193.0
1983	1,525,125	5,405,190	42,258	225.3
1984	1,926,420	7,256,710	48,628	263.4
1985	2,386,395	9,568,805	56,640	309.1
		UNITED STATES		
1975	50,300	212,640	$ 6,678	$ 37.9
1976	65,340	261,680	7,098	43.4
1977	112,280	355,120	8,969	50.5
1978	225,530	563,550	10,865	58.9
1979	312,910	849,560	12,635	67.2
1980	462,490	1,283,750	15,177	78.7
1981	623,085	1,875,335	17,876	92.1
1982	815,075	2,655,410	21,043	108.4
1983	1,043,035	3,658,345	24,208	127.0
1984	1,308,430	4,916,775	28,023	149.3
1985	1,611,960	6,476,835	33,012	176.3
		INTERNATIONAL		
1975	25,300	116,800	$ 5,577	$ 29.2
1976	35,800	145,950	6,234	33.3
1977	49,690	189,940	7,164	38.8
1978	86,590	274,090	8,943	45.9
1979	160,670	428,660	10,378	53.7
1980	226,955	646,215	11,617	62.7
1981	289,960	922,875	13,639	73.0
1982	375,880	1,283,055	15,540	84.6
1983	482,090	1,746,845	18,050	98.3
1984	617,990	2,339,935	20,605	114.1
1985	774,435	3,091,970	23,628	132.8

This is the total of all general-purpose computers, minis, small business computers (SBCs), desktop computers, and "other" systems such as IBM's S/7. Minis used in SBCs are subtracted to eliminate double counting. Detailed tables follow (general-purpose, SBC, and desktop tables are mutually exclusive, but the minicomputer table includes computers subsequently shipped to users -- by the minimakers or by systems houses -- as SBCs).

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GENERAL PURPOSE COMPUTER MARKET
(U.S.-Based Manufacturers)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1975	13,500	114,100	$ 10,610	$ 61.2
1976	14,800	111,200	10,830	68.5
1977	17,800	111,500	12,500	77.7
1978	11,100	112,800	14,590	88.4
1979	10,600	107,500	15,270	97.4
1980	23,400	115,100	17,060	108.8
1981	26,500	124,800	18,400	120.2
1982	24,600	134,100	19,700	132.2
1983	21,800	142,500	20,700	144.3
1984	27,400	151,600	21,500	157.0
1985	26,200	160,500	22,900	170.5
		UNITED STATES		
1975	6,700	62,100	$ 5,610	$ 33.8
1976	7,200	59,600	5,530	37.9
1977	8,900	58,200	6,600	42.9
1978	4,500	57,900	7,500	48.3
1979	5,000	53,300	7,670	52.2
1980	11,800	56,500	9,170	58.2
1981	12,800	60,800	9,500	63.9
1982	11,600	64,800	10,300	70.1
1983	10,300	68,900	10,500	76.0
1984	13,200	73,400	10,900	82.3
1985	12,300	77,600	11,700	89.1
		INTERNATIONAL		
1975	6,800	52,000	$ 5,000	$ 27.4
1976	7,600	51,600	5,300	30.6
1977	8,900	53,300	5,900	34.8
1978	6,600	54,900	7,090	40.1
1979	5,600	54,200	7,600	45.2
1980	11,600	58,600	7,890	50.6
1981	13,700	64,000	8,900	56.3
1982	13,000	69,300	9,400	62.1
1983	11,500	73,600	10,200	68.3
1984	14,200	78,200	10,600	74.7
1985	13,900	82,900	11,200	81.4

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MINICOMPUTER MARKET
(U.S.-Based Manufacturers)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1975	48,600	181,400	$ 1,155	$ 3.8
1976	58,600	235,500	1,550	5.2
1977	82,900	312,300	2,215	7.3
1978	101,500	405,600	2,985	10.0
1979	123,900	518,000	4,085	13.8
1980	150,800	651,700	5,015	18.4
1981	180,100	809,700	6,190	24.1
1982	215,300	997,300	7,710	31.2
1983	256,100	1,220,200	9,455	39.9
1984	300,800	1,482,000	11,345	50.4
1985	349,800	1,784,800	13,470	62.8
		UNITED STATES		
1975	34,500	126,300	$ 725	$ 2.6
1976	42,200	162,500	995	3.4
1977	60,600	215,300	1,445	4.7
1978	70,400	275,800	1,915	6.4
1979	82,100	345,200	2,665	8.7
1980	90,200	419,700	3,130	11.5
1981	108,100	508,800	3,840	15.0
1982	127,000	613,000	4,705	19.2
1983	151,100	737,100	5,770	24.4
1984	174,500	880,100	6,805	30.5
1985	202,900	1,045,600	8,080	37.8
		INTERNATIONAL		
1975	14,100	55,100	$ 430	$ 1.2
1976	16,400	73,000	555	1.8
1977	22,300	97,000	770	2.6
1978	31,100	129,800	1,070	3.6
1979	41,800	172,800	1,420	5.1
1980	60,600	232,000	1,885	6.9
1981	72,000	300,900	2,350	9.1
1982	88,300	384,300	3,005	12.0
1983	105,000	483,100	3,685	15.5
1984	126,300	601,900	4,540	19.9
1985	146,900	739,200	5,390	25.0

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General-Purpose Computer Census are based on the best information available to IDC but are estimates nevertheless. General Purpose computers -- as characterized by IBM's System/3, System/38, 370, 4300, 303X, and 3081, and competitors -- are designed for use in a wide variety of applications. They are character or byte oriented and programmed in higher level languages. Many of the General-Purpose computer manufacturers also market smaller systems, also general-purpose in design, which are included in the Small Business Computer and Minicomputer censuses.

Instead of being defined by shifting average purchase or rental values, size classes are based on IBM products and other manufacturers' models that compete with them, e.g., a computer in size class 7 would compete with an IBM 3033. Average purchase and monthly rental values are based on system price including peripherals except for plug compatible vendors Amdahl, Cambex, CDC-Omega, IPL, Magnuson, and NAS, where only CPU value is counted. An "X" in the last column means none will be shipped from the original manufacturer, and an "*" means none will be shipped until after 1981.

AS OF JANUARY 1, 1981

NAME OF MANUFACTURER	COMPUTER MODEL	SIZE CLASS	AVERAGE MONTHLY RENTAL ($000)	AVERAGE PURCHASE PRICE ($000)	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	ORDERS FOR 1981 INSTALLATION
Amdahl	470V/5, II	6	69.0	2,205	9/77	41	33	74	X
	470V/6, II	7	91.0	3,260	6/75	130	52	182	X
	470V/7C	6	69.0	1,100	30/81	-	-	-	50
	470V/7, A, B	7	98.0	2,530	9/78	90	70	160	75
	470V/8	7	112.0	2,900	9/79	48	32	80	55
	580/5860	7	130.0	4,100	4/82	-	-	-	*
	580/5880	7	235.0	7,500	20/83	-	-	-	*
	Total					309	187	496	180
Burroughs	2/3/500	3	6.6	315	11/61	180	160	340	X
	1710	2	2.8	132	8/72	525	510	1,035	X
	1720	3	7.3	350	2/73	370	270	640	X
	1815/25/30	2	3.0	118	5/77	260	510	770	1,400
	1855/60/70/85	3	6.1	245	5/77	1,180	460	1,640	
	1905	2	3.2	95	4/80	10	10	20	
	1955/85	3	6.2	185	4/80	375	150	525	X
	2500	4	10.4	499	2/67	17	30	47	X
	2700	4	11.0	530	8/72	195	125	320	X
	2800	4	10.4	415	12/76	255	145	400	X
	2900	4	12.9	450	7/80	70	85	155	275
	3500	4	19.0	911	5/67	175	185	360	X
	3700	4	26.0	1,230	11/72	235	245	480	X
	3800	4	15.8	630	4/77	250	75	325	95
	3900	4	18.6	650	/81	-	-	-	
	45/4700	5	33.0	1,560	10/71	260	115	375	X
	4800	5	32.0	1,290	9/76	230	90	320	25
	55/5700	5	35.0	1,680	3/63	18	11	29	X
	5900	5	26.0	800	20/81	-	-	-	90
	65/6700	6	66.0	3,170	11/69	125	110	235	X
	6800	5	43.0	1,630	6/77	280	120	400	170
	6900	5	66.0	2,100	11/80	34	5	39	
	7700	7	134.0	6,440	8/73	48	27	75	X
	7800	7	126.0	4,800	11/78	38	20	58	35
	Total					5,130	3,458	8,588	2,090
Cambex	1636	4	4.3	130	/81	-	-	-	5
	1638/40	4	3.8	115	1/79	12	7	19	X
	1641	4	6.8	205	10/80	-	3	3	20
	1651	5	9.5	285	30/81	-	-	-	2
	Total					12	10	22	27
CDC	Omega 480-1	4	12.5	375	6/77	67	2	69	5
	Omega 480-2	5	13.0	390	8/78	51	2	53	5
	Omega 480-3	5	17.5	420	1/80	22	1	23	30
	Subtotal					140	5	145	40
	Cyber 170-720	5	35.0	1,400	5/79	52	55	107	65
	Cyber 170-730	6	50.0	2,000	6/79	28	10	38	25
	Cyber 170-740	6	73.0	2,900	4/80	2	-	2	5
	Cyber 170-750	6	108.0	4,300	8/79	11	10	21	13
	Cyber 170-760	7	138.0	5,500	4/79	9	2	11	10
	Cyber 71	4	21.0	915	7/76	4	9	13	X
	Cyber 171	4	28.0	1,080	8/77	21	50	71	X
	Cyber 72	5	42.0	1,810	10/71	13	35	48	X
	Cyber 172	6	51.0	1,930	7/75	26	47	73	X
	Cyber 73	6	61.0	2,630	3/72	20	35	55	X
	Cyber 173	6	83.0	3,150	9/75	11	29	40	X
	Cyber 74	7	116.0	5,000	3/72	22	15	37	X
	Cyber 174	6	105.0	3,980	9/75	14	20	34	X
	Cyber 175	7	150.0	5,700	8/75	25	37	62	X
	Cyber 76	7	184.0	7,905	3/72	7	8	15	X
	Cyber 176	7	180.0	7,200	1/78	10	2	12	2
	Cyber 203	7	238.0	9,500	11/80	2	-	2	X
	Cyber 205	7	263.0	10,500	10/81	-	-	-	5
	Subtotal					277	364	641	125
	G-20	4	19.3	830	4/61	1	-	1	X
	1604	6	41.0	1,750	1/60	5	-	5	X
	31/3150	4	9.7	419	12/64	39	18	57	X
	3170	5	23.0	970	12/70	14	13	27	X
	3200	4	14.5	625	5/64	20	16	36	X
	3300	5	35.0	1,491	9/65	74	39	113	X
	3400	5	24.0	1,019	11/64	3	-	3	X
	3500	5	31.0	1,341	1/69	29	10	39	X
	3600	6	49.0	2,107	6/63	9	8	17	X
	3800	6	60.0	2,568	12/65	12	1	13	X
	6200	6	42.0	1,825	11/70	-	1	1	X
	6400	6	63.0	2,723	5/66	35	19	54	X
	6500	6	86.0	3,700	12/67	15	12	27	X
	6600	7	116.0	4,990	8/64	38	21	59	X
	6700	7	140.0	6,005	7/70	3	-	3	X
	7600	7	191.0	8,200	1/69	20	7	27	X
	Star 100	7	279.0	12,010	12/74	3	-	3	X
	Subtotal					320	165	485	
	Total					737	534	1,271	165
Cray	1A	7	213.0	8,530	4/76	10	6	16	10
	1S	7	177.0	7,070	11/80	3	-	3	
	Total					13	6	19	10
DEC	2020	3	7.3	290	7/78	175	140	315	125
	2040/50	4	17.0	680	6/76	130	85	215	5
	2060	5	23.0	900	7/79	125	55	180	75
	PDP-6	4	10.0	400	10/64	2	1	3	X
	1040/50	4	17.3	693	10/67	125	80	205	X
	1060/70	5	22.0	860	6/72	120	100	220	X
	1080/90	6	33.0	1,300	6/75	175	105	280	25
	Total					852	566	1,418	230

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GENERAL-PURPOSE COMPUTER CENSUS - (Continued)

AS OF JANUARY 1, 1981

NAME OF MANUFACTURER	COMPUTER MODEL	SIZE CLASS	AVERAGE MONTHLY RENTAL ($000)	AVERAGE PURCHASE PRICE ($000)	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	ORDERS FOR 1981 INSTALLATION
Honeywell	DPS 8/20	4	14.8	490	4/80	20	5	25	190
	DPS 8/44	4	24.0	780	1/80	25	5	30	100
	DPS 8/52	5	53.0	1,760	11/80	5	2	7	90
	DPS 8/62	5	67.0	2,200	3Q/81	-	-	-	50
	DPS 8/70	6	103.0	3,400	5/80	15	5	20	140
	Subtotal					65	17	82	570
	H-61/40	2	2.4	97	6/76	-	1,650	1,650	
	H-61/58	2	2.5	104	6/74	90	720	810	750
	H-61/60	2	3.7	150	6/74	45	2,100	2,145	
	H-Level 62, DPS 4	3	5.8	230	10/74	1,000	2,350	3,350	470
	H-64/300	4	9.7	360	4/79	95	375	470	230
	H-Level 64	4	12.8	525	10/74	260	1,025	1,285	X
	H-66/05/07	4	20.0	825	10/76	105	135	240	X
	H-66/10/17	5	32.0	1,320	6/75	65	105	170	X
	H-66/20/27	5	46.0	1,870	11/74	140	160	300	X
	H-66/40/60	6	87.0	3,570	10/74	190	160	350	10
	H-66/440/520	5	20.0	800	12/79	85	40	125	10
	H-66/DPS, 8C	6	82.5	3,300	7/78	110	170	280	45
	H-66/80	7	135.0	5,550	10/74	28	55	83	10
	H-68/80	7	117.0	4,775	10/74	30	3	33	X
	H-68/DPS	7	130.0	5,200	9/78	15	9	24	15
	Comshare/Xerox	5	14.6	600	6/79	10	-	10	10
	Subtotal					2,268	9,057	11,325	1,550
	G-50	2	2.0	82	8/70	95	1,050	1,145	X
	G-100	3	5.1	215	4/66	70	840	910	X
	G-200	4	10.1	425	4/61	75	13	88	X
	G-400	4	16.7	700	5/64	140	110	250	X
	G-600	6	81.0	3,400	4/65	27	13	40	X
	G-6023/25	5	35.0	1,490	11/73	21	18	39	X
	G-6030/40	5	45.0	1,900	6/71	38	86	124	X
	G-6050/60	6	77.0	3,250	7/71	100	55	155	X
	G-6070/80	6	116.0	4,890	7/71	34	32	66	X
	G-6180	7	113.0	4,750	2/74	5	-	5	X
	Gamma-10	2	2.6	108	7/64	-	350	350	X
	Gamma-30	4	10.4	437	2/62	-	27	27	X
	Subtotal					605	2,594	3,199	
	H-105/115	3	6.8	280	3/70	100	125	225	X
	H-110/120/200	3	7.0	285	1/66	230	110	340	X
	H-125	4	8.9	365	12/67	10	60	70	X
	H-2020/30	3	4.6	190	1/73	300	80	380	X
	H-1015/2015	4	19.6	805	2/71	30	21	51	X
	H-1200	4	15.3	629	2/66	145	38	183	X
	H-2040	4	14.5	595	4/72	155	64	219	X
	H-2050/60	4	22.0	920	4/72	110	82	192	X
	H-2200	4	21.0	862	1/66	57	18	75	X
	H-2070	5	39.0	1,600	5/72	26	2	28	X
	H-3200	5	30.0	1,220	2/70	55	28	83	X
	H-4200	5	47.0	1,920	9/68	6	2	8	X
	H-8200	6	72.0	2,950	2/69	13	8	21	X
	H-4/1400	4	13.7	560	12/61	6	7	13	X
	H-8/1800	5	37.0	1,500	12/60	6	3	9	X
	Subtotal					1,249	648	1,897	
	Total					4,187	12,316	16,503	2,120
IBM	System/38-3	2	3.9	125	7/80	600	840	1,440	2,450
	System/38-5	3	8.3	265	7/80	1,900	1,460	3,360	5,350
	Subtotal					2,500	2,300	4,800	7,800
	System/3-4	2	1.6	58	6/76	200	60	260	X
	System/3-6	2	2.1	75	12/70	470	370	840	X
	System/3-8	2	2.6	94	6/75	1,800	2,420	4,220	X
	System/3-10	2	3.2	115	1/70	4,450	3,100	7,550	X
	System/3-12	3	4.7	169	3/76	2,600	2,700	5,300	X
	System/3-15	3	8.6	310	3/74	3,380	2,050	5,430	X
	Subtotal					12,900	10,700	23,600	
	4331-1	3	11.6	370	4/79	3,600	2,300	5,900	2,900
	4331-2	4	17.0	545	8/80	300	300	600	3,050
	4341-1	4	26.0	835	10/79	1,650	2,050	3,700	2,300
	4341-2	5	37.0	1,185	2Q/81	-	-	-	1,350
	Subtotal					5,550	4,650	10,200	9,600
	3031	6	69.0	2,290	3/78	1,000	1,180	2,180	40
	3032	6	118.0	3,900	3/78	290	470	760	X
	3033S	6	96.0	2,200	1/81	-	-	-	500
	3033N	7	133.0	3,600	1/80	150	140	290	280
	3033U,A,M	7	208.0	6,850	3/78	825	550	1,375	290
	30810	7	219.0	7,000	4Q/81	-	-	-	75
	Subtotal					2,265	2,340	4,605	1,185
	370/115	3	11.3	450	4/74	480	1,660	2,140	X
	370/125	4	15.5	620	6/73	550	1,330	1,880	X
	370/135	4	24.0	960	5/72	710	1,130	1,840	X
	370/138	4	25.0	890	11/76	1,670	2,350	4,020	X
	370/145	5	45.0	1,790	7/71	780	960	1,740	X
	370/148	5	44.0	1,540	3/77	1,370	1,470	2,840	X
	370/155	6	81.0	3,250	2/71	335	190	525	X
	370/158	6	126.0	5,025	5/73	1,500	1,250	2,750	X
	370/165	7	153.0	6,100	6/71	70	28	98	X
	370/168	7	226.0	9,050	7/73	610	305	915	X
	370/195	7	311.0	12,450	3/71	9	3	12	X
	Subtotal					8,084	10,676	18,760	
	360/20	3	2.9	136	12/65	550	700	1,250	X
	360/22	3	3.7	174	7/71	30	58	88	X
	360/25	3	8.3	391	10/68	35	215	250	X
	360/30	4	11.2	528	6/65	820	480	1,300	X
	360/44	4	18.7	880	7/66	39	23	62	X
	360/40	4	19.0	895	6/65	700	480	1,180	X
	360/50	5	33.0	1,550	8/65	325	190	515	X
	360/65	6	69.0	3,250	11/65	290	95	385	X
	360/67, 75, 85	7	128.0	6,020	1/66	29	14	43	X
	360/9X	7	195.0	9,150	11/67	6	4	10	X
	Subtotal					2,824	2,259	5,083	
	1130	2	2.5	120	2/66	900	760	1,660	X
	1401	3	3.7	178	9/60	360	250	610	X
	1401-G, H	2	2.2	106	5/64	9	3	12	X
	1410	4	16.7	800	11/61	11	8	19	X
	1440	3	4.7	227	4/63	29	48	77	X
	1460	4	9.6	460	10/63	6	4	10	X
	1620	3	2.7	129	9/60	48	48	96	X
	7010	5	25.0	1,200	10/63	4	3	7	X
	7040/44	5	30.0	1,439	6/63	4	5	9	X
	7070/74	5	27.0	1,299	3/60	43	3	46	X
	7080	6	58.0	2,800	8/61	14	-	14	X
	7090/94	6	70.0	3,350	8/60	12	6	18	X
	Subtotal					1,440	1,138	2,578	X
	Total					35,563	34,063	69,626	18,585

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GENERAL-PURPOSE COMPUTER CENSUS - (Continued)

AS OF JANUARY 1, 1981

NAME OF MANUFACTURER	COMPUTER MODEL	SIZE CLASS	AVERAGE MONTHLY RENTAL ($000)	AVERAGE PURCHASE PRICE ($000)	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	ORDERS FOR 1981 INSTALLATION
IPL	4436	4	5.8	175	/81	-	-	-	] 70
	4443	4	7.5	225	3/80	10	40	50	
	Total					10	40	50	70
Magnuson	M80/3	4	6.5	195	1/79	19	1	20	X
	M80/4	5	10.3	310	12/78	85	15	100	X
	M80/31	4	4.8	145	6/80	28	2	30	50
	M80/32	4	7.3	220	6/80	48	2	50	90
	M80/42	4	10.8	325	/81	-	-	-	25
	M80/43	5	12.3	370	20/81	-	-	-	20
	M80/44	5	12.7	380	30/81	-	-	-	10
	Total					180	20	200	195
National Advanced Systems	AS/3000	4	14.0	420	1/80	22	5	27	40
	AS/5000	5	19.2	575	2/80	30	10	40	75
	AS/7000	6	52.0	1,550	4/80	15	13	28	55
	AS/9000	7	137.0	4,100	11/80	1	1	2	15
	AS/3	4	17.7	585	11/78	35	35	70	X
	AS/4	5	27.0	885	6/77	33	16	49	X
	AS/5	6	43.0	1,420	3/77	130	95	225	X
	AS/7020/30	5	23.0	750	1/79	-	11	11	X
	AS/7031	6	38.0	1,250	12/78	45	35	80	X
	AS/6	6	68.0	2,250	5/78	50	40	90	X
	Total					361	261	622	185
NCR	8270	2	2.1	80	11/79	235	350	585	450
	8350	2	3.8	144	7/77	135	15	150	X
	8370	3	6.8	260	7/78	10	-	10	X
	8410	2	3.8	143	1/79	430	75	505	330
	8430	3	6.2	235	6/78	78	135	213	70
	8450	3	8.8	335	11/77	285	170	455	X
	8455	3	8.2	245	4/79	270	80	350	190
	8550	3	14.7	560	4/76	260	225	485	X
	8555	3	13.0	390	7/79	270	140	410	280
	8560	4	17.9	680	11/77	68	34	102	X
	8565	4	17.0	510	4/79	85	75	160	120
	8570	4	22.0	830	5/76	100	115	215	X
	8575	4	22.0	650	4/79	50	40	90	70
	8580	5	41.0	1,550	12/78	9	11	20	X
	8585	5	43.0	1,300	8/79	20	30	50	35
	8650	6	67.0	2,350	/81	-	-	-	5
	8670	7	100.0	3,500	/81	-	-	-	5
	Subtotal					2,305	1,495	3,800	1,555
	Century 50	2	1.7	80	2/71	210	27	237	X
	Century 75	2	2.4	112	7/76	60	-	60	X
	Century 100	3	3.4	157	9/68	195	425	620	X
	Century 101	3	4.4	201	10/72	530	510	1,040	X
	Century 151	3	6.0	275	2/75	195	115	310	X
	Century 200	4	8.0	367	9/69	115	235	350	X
	Century 201	4	12.8	590	8/74	155	95	250	X
	Century 251	4	22.0	1,005	11/73	33	46	79	X
	Century 300	5	29.0	1,340	2/72	72	72	144	X
	315	3	3.6	164	5/62	20	65	85	X
	315-RMC	4	10.9	500	9/65	3	11	14	X
	Subtotal					1,588	1,601	3,189	
	Total					3,893	3,096	6,989	1,555
Singer	System 10	2	2.7	120	10/70	1,200	-	1,200	X
Sperry Univac	III	4	27.0	1,124	8/62	65	18	83	X
	SS80/90	3	8.5	355	8/58	-	2	2	X
	4181, II	4	10.7	450	6/63	41	47	88	X
	418 III	4	40.0	1,700	6/69	44	80	124	X
	491/492	5	27.0	1,150	12/61	7	8	15	X
	494	6	76.0	3,200	2/66	55	49	104	X
	1004	2	1.1	46	2/63	150	110	260	X
	1005	2	2.0	85	4/66	135	44	179	X
	1050	3	9.0	380	9/63	115	22	137	X
	Subtotal					612	380	992	
	9200	2	2.3	98	6/67	300	325	625	X
	9300	3	5.0	212	9/67	245	270	515	X
	9400/80	4	12.6	530	5/69	135	245	380	X
	90/25	3	4.6	180	8/77	100	100	200	X
	90/30	3	9.7	380	2/75	990	1,300	2,290	50
	90/40	4	17.3	675	6/78	130	155	285	45
	90/60	4	28.0	1,090	1/74	120	175	295	10
	90/70/9700	5	33.0	1,275	8/72	17	39	56	X
	90/80	5	74.0	2,900	12/76	105	50	155	50
	System/80-3	2	4.2	130	12/80	15	10	25	470
	System/80-5	3	9.7	300	20/81	-	-	-	280
	Subtotal					2,157	2,669	4,826	905
	1106	6	46.0	1,920	12/69	43	160	203	X
	1107	6	60.0	2,525	10/62	3	7	10	X
	1108	7	89.0	3,750	9/65	125	90	215	X
	1110	7	149.0	6,250	6/72	38	55	93	X
	1100/10	5	51.0	1,880	4/76	110	170	280	X
	1100/20	5	69.0	2,540	4/75	21	36	57	X
	1100/40	6	116.0	4,300	7/75	34	38	72	X
	1100/60	5	49.0	1,700	1/80	75	105	180	275
	1100/80/81/82	6	138.0	5,100	3/77	150	165	315	100
	1100/83	7	222.0	8,200	7/78	1	1	2	2
	1100/84	7	268.0	9,900	11/78	1	1	2	2
	Subtotal					601	828	1,429	379
	301	4	6.7	295	10/60	7	2	9	X
	501	5	15.8	695	6/59	-	-	-	X
	3301	5	23.0	1,021	6/64	29	-	29	X
	Spectra 70/15	3	4.6	203	9/65	2	-	2	X
	Spectra 70/25	3	7.8	343	9/65	-	7	7	X
	Spectra 70/35	4	14.4	634	1/67	34	3	37	X
	Spectra 70/45	5	27.0	1,181	11/65	78	2	80	X
	Spectra 70/46	5	45.0	1,963	11/68	10	-	10	X
	Spectra 70/55	5	41.0	1,800	11/68	1	-	1	X
	Spectra 70/60	6	51.0	2,245	9/70	17	-	17	X
	Spectra 70/61	6	53.0	2,350	3/71	3	1	4	X
	Spectra 1600	3	4.1	180	1/69	21	-	21	X
	Spectra 70/2	4	14.1	620	7/71	9	-	9	X
	Spectra 70/3	4	24.0	1,040	10/71	7	-	7	X
	Spectra 70/6	6	38.0	1,680	10/71	21	-	21	X
	Spectra 70/7	6	49.0	2,140	10/71	12	4	16	X
	Subtotal					251	19	270	
	Total					3,621	3,896	7,517	1,284
Xerox	Sigma 5	4	14.6	585	8/67	115	15	130	X
	Sigma 6	4	26.0	1,030	11/70	30	16	46	X
	Sigma 7	5	29.0	1,170	12/66	57	8	65	X
	Sigma 8	4	23.0	920	9/71	1	3	4	X
	Sigma 9	6	60.0	2,400	11/71	76	31	107	X
	530	3	4.5	180	8/73	97	18	115	X
	550/560	4	15.6	625	11/74	26	5	31	X
	940	5	26.0	1,050	4/66	33	3	36	X
	9300	3	8.5	340	11/64	12	4	16	X
	Total					447	103	550	
TOTAL						56,515	58,556	115,071	26,696

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MINICOMPUTER CENSUS

IDC categorizes certain computers as "minicomputers" based primarily on the perceived marketplace for these products. By definition, minis are general purpose in design, but are sold as tools as well as solutions; are available from makers in configurations ranging from board only to complete systems; are available to OEMs and are usually discounted in volume buys; are part of a family with low end products generally in the $1,000 - $25,000 price range; and have at least 4K RAM. Minicomputers range in size class from Microminis (M) which compete with high end micromputers to Traditional Minis (T) to Superminis (S), which frequently compete with small General Purpose Computers in interactive commercial applications. This Census counts "Cumulative Number Shipped," making no attempt to account for retirements.

AS OF JANUARY 1, 1981

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	SIZE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	CUMULATIVE NUMBER SHIPPED IN U.S.	CUMULATIVE NUMBER SHIPPED OUTSIDE U.S.	CUMULATIVE NUMBER SHIPPED TOTAL	ORDERS FOR 1981 INSTALLATION
Ampex	8MS/8C	16	T	7	6	6/78	2,500	2,000	4,500	1,700
	Difference Series	16	T	14	19	12/80	15	0	15	150
	Total						2,515	2,000	4,515	1,850
Artonix*	PC-12/7	12	T	20	45	9/71	135	40	175	X
BTI Computer Systems	4000/15	16	T	30	35	1/76	341	8	349	X
	4000/25	16	T	42	49	1/76	251	12	263	X
	5000	16	S	30	39	9/78	2,265	65	2,330	860
	5000/ES	16	S	25	30	7/79	72	0	72	20
	8000	32	S	107	200	5/81	0	0	0	80
	Total						2,929	85	3,014	960
Bytronix	Series 500	16	T	3	4	9/80	75	25	100	750
	Series 1000	16	T	5	5	12/77	130	400	530	200
	Series 2000	16	T	8	8	12/78	50	90	140	50
	Series 3000	16	T	7	8	12/78	60	420	480	300
	Total						315	935	1,250	1,300
Century Computer Corp.	C-200	8	T	5	7	2/71	150	0	150	X
Cincinnati Milacron	CIP/2000 Series	8	T	4	17	7/69	4,650	800	5,450	NA
	CIP/4000 Series	10	T	4	17	12/76				X
Compiler Systems, Inc.*	CSI-16	16	T	11	20	11/70	80	10	90	X
	CSI-24	24	T	15	30	12/70	35	5	40	X
	Total						115	15	130	
Computer Automation, Inc.	108, 208, 808	8	T	5	11	4/68	280	30	310	X
	116	16	T	8	16	8/70	200	50	250	X
	216	16	T	8	20	7/69	350	45	395	X
	816	16	T	10	15	12/68	40	5	45	X
	Alpha 8, Naked Mini-8	8	T	2	3	5/72	5,002	1,340	6,342	X
	Alpha-16, Naked Mini-16	16	T	3	8	10/71				
	LSI 2/10, 2/20, 2/60	16	T, T, S	2	5	12/73	20,472	2,150	22,622	NA
	LSI 2/40	16	T	8	18	4/80	13	6	19	NA
	LSI 3/05	16	M	1	2	2/76	2,308	631	2,939	NA
	LSI 4/10	16	M	1	2	6/77	3,196	1,048	4,244	NA
	LSI 4/30	16	T	2	4	6/77	1,160	328	1,488	NA
	LSI 4/90	16	S	4	9	6/77	603	111	714	NA
	LSI 4/95	16	S	10	24	1/80	12	8	20	NA
	Scout Naked Mini 4/04	16	M	0.6	2	1/80	267	98	365	NA
	Total						33,903	5,850	39,753	
Computer Talk, Inc.	CT-400	16	S	25	30	9/75	4	0	4	1
	CT-407	16	S	32	37	12/77	2	0	2	1
	Total						6	0	6	2
Control Data Corp.	1700	16 + 2	S	37	160	3/66				X
	1700-SC	16 + 2	S	20	60	9/70				X
	System 17	16 + 2	T	14	39	2/74				X
	Cyber 18-10	16 + 2	T	14	40	/76	1,920	1,295	3,215	
	Cyber 18-20	16 + 2	T	16	75	/76				NA
	Cyber 18-30	16 + 2	S	110	116	9/76				
	Cyber 18-5	16 + 2	T	14	35	/77				
	Elbit-100	12	T	6	8	6/77	5	445	450	X
	Total						1,925	1,740	3,665	
Data General Corp.	MP 100, 200	16	M	1	3	5/79	2,550	750	3,300	2,500
	MicroNova	16	M	2	4	11/79	4,270	1,990	6,260	2,200
	Nova	16	T	6	12	2/69	770	380	1,150	X
	Nova 2 Series	16	T	3	10	10/73	7,280	2,720	10,000	150
	Nova 3/4	16	T	4	10	1/76	3,770	1,230	5,000	
	Nova 3/12	16	T	5	18	1/76	12,360	5,640	18,000	8,000
	Nova 3/D	16	T	12	36	10/76	2,600	2,400	5,000	
	Nova 4/C	16	T	3	12	3/79				
	Nova 4/S	16	T	3	16	3/79	4,800	3,200	8,000	9,500
	Nova 4/X	16	T	10	33	3/79				
	Nova 800/820	16	T	7	40	3/71	2,210	790	3,000	X
	Nova 830/840	16	S	16	44	7/73	670	350	1,020	X
	Nova 1200 Series	16	T	3	11	12/70	10,870	4,130	15,000	X
	Super Nova SC	16	T	9	27	4/70	340	160	500	X
	Eclipse S100, 130, 140	16	S	11	30	2/75	2,000	1,000	3,000	700
	Eclipse AP/130	16	S	30	50	9/78				
	Eclipse S200, 230	16	S	15	55	2/75	3,350	1,150	4,500	700
	Eclipse S/250	16	S	35	150	11/78	340	110	450	100
	Eclipse C/150	16	S	55	120	12/78	250	150	400	150
	Eclipse C/300, 330	16	S	24	150	2/75	970	230	1,200	300
	Eclipse C/350	16	S	130	180	11/78	450	150	600	330
	Eclipse M/600	16	S	164	215	5/78	270	80	350	320
	Eclipse MV/8000	32	S	153	300	10/80	25	15	40	400
	Subtotal						60,145	26,625	86,770	25,350
	DCC-112	12	T	3	12	8/70	700	400	1,100	X
	DCC-116	16	T	5	10	11/71	7,450	1,350	8,800	X
	DCC-416/616	16	T/S	3	7	9/75	125	15	140	X
	DCC-Model 5	16	T	3	6		80	10	90	X
	Subtotal						8,355	1,775	10,130	25,350
	Total						68,500	28,400	96,900	25,350
Datamate Computer Systems*	DM-16	16	T	17	26	11/69	12	0	12	X
	DM-70	16	T	9	15	12/70	25	0	25	X
	ECP-18	18	T	14	16	11/66	21	0	21	X
	Total						58	0	58	
Datum, Inc.*	Enhancer E 1/16	16	T	8	15	3/76	15	3	18	X
Digiac Corp.*	3060		T	9	13	1/70	70	20	90	X
	3080	25	T	20	25	12/64	14	2	16	X
	Total						84	22	106	
Digital Equipment Corp.	PDP-8/a, e, f, m	12	T	4	15	4/71	34,300	15,950	50,250	700
	PDP-8/i, l, s	12	T	8	27	5/65	5,765	3,685	9,450	X
	PDP-9, 9L	18	T	35	50	12/66	290	160	450	X
	PDP-11/03, LSI-11	16	M	2	3	6/75	80,650	45,850	126,500	71,000
	PDP-11/23, LSI 11/23	16	M	2	6	/79				
	PDP-11/04, 05, 10, 15, 20	16	T	5	17	3/70	30,650	17,250	47,900	4,700
	PDP-11/34, 35, 40	16	T	9	40	1/73	21,900	15,600	37,500	11,000
	PDP-11/44	16	S	23	60	/80	1,500	400	1,900	4,500
	PDP-11/45, 50, 55	16	S	24	91	4/72	3,500	1,500	5,000	400
	PDP-11/60	16	S	26	75	6/77	970	950	1,920	50
	PDP-11/70	16	S	60	175	7/75	6,600	3,100	9,700	1,700
	VAX-11/750	32	S	47	100	/80	180	20	200	800
	VAX-11/780	32	S	128	255	5/78	1,450	900	2,350	3,000
	PDP-12	12	T	13	46	4/69	510	255	765	X
	PDP-15 XVM	18	T	15	82	2/70	550	320	870	X
	Total						188,815	105,940	294,755	97,850

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NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	SIZE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	CUMULATIVE NUMBER SHIPPED IN U.S.	CUMULATIVE NUMBER SHIPPED OUTSIDE U.S.	CUMULATIVE NUMBER SHIPPED TOTAL	ORDERS FOR 1981 INSTALLATION
Digital Microsystems	Hex-29	16	S	13	22	4/79	15	15	30	50
Digital Scientific Corp.	Meta-4/4000	16	S	29	90	4/70	140	15	155	X
	Meta-4/5010	16	S	21	40	10/78	5	0	5	X
	Meta-4/5020	16	T	25	90	4/78	45	0	45	NA
	Meta-4/5030	16	S	53	140	6/79	10	0	10	NA
	Total						200	15	215	
Electronic Associates, Inc.	Pacer-100	16	T	15	40	5/72	160	128	288	NA
Foto-Mem, Inc.*	Contour-100	8	T	6	20	4/70	25	0	25	X
Four-Phase Systems, Inc.[a]	Two Pi V/32	32	S	125	125	6/78	100	6	106	X
	System 311	32	S	160	265	/81	0	0	0	NA
	System 312	32	S	210	320	/81	0	0	0	NA
	Total						100	6	106	
General Automation, Inc.	GA-18/30	16	S	18	50	7/69	780	210	990	X
	SPC-12	8	T	4	16	1/68	3,250	860	4,110	X
	SPC-16	16	T	5	25	5/70	7,490	1,980	9,470	X
	16/110, 220	16	M	1	3	12/75	6,080	1,940	8,020	3,000
	16/330, 340	16	T	3	10	1/76	405	140	545	140
	16/440, 460	16	S	12	30	7/75	2,000	565	2,565	470
	16/550	16	S	25	50	3/78	9	2	11	X
	230, 240	16	M	7	9	5/80	373	162	535	800
	470, 480	16	S	16	21	8/80	350	170	520	780
	Total						20,737	6,029	26,766	5,790
GRI Computer Corp.	909 Series	16	T	4	9	1/70	320	150	470	X
	99/30, 38	16	T	5	15	6/72	578	268	846	X
	99/10, 18	16	T	3	5	6/72	24	0	24	X
	99/40, 48	16	T	6	17	6/72	207	278	485	X
	99/50, 58	16	T	6	12	/74	146	44	190	X
	99/52	16	T	8	17	/76	7	3	10	X
	GRIP	16	T	30	30	11/78	25	0	25	100
	Total						1,307	743	2,050	100
GT&E*	IS/I	16	T	14	36	1/70	160	40	200	X
	IS/1000	16	T	6	10	6/72	4,000	75	4,075	X
	Total						4,160	115	4,275	
Harris	6024/1	24	S	69	135	5/69	21	1	22	X
	6024/3	24	S	49	90	2/70	118	1	119	X
	Slash 4	24	S	24	110	8/73	233	18	251	13
	Slash 5	24	S	16	50	5/72	649	10	659	6
	Slash 6	24	S	20	70	12/76	275	10	285	76
	Slash 7	24	S	45	180	10/75	18	1	19	X
	Series 100	24	S	85	190	10/75	37	1	38	X
	Series 200	24	S	179	240	10/75	52	3	55	1
	Series 1X5	24	S	85	175	9/77	110	25	135	10
	Series 5X0	24	S	195	300	12/78	72	8	80	X
	H80	24	S	70	125	2/81	0	0	0	28
	H100	24	S	45	150	11/79	103	9	112	58
	H300	24/48	S	105	200	/81	0	0	0	5
	H500	24/48	S	100	250	11/79	117	4	121	83
	H800	24/48	S	170	275	3/80	51	4	55	48
	Total						1,856	95	1,951	328
Hewlett-Packard	2100A	16	T	7	15	6/71	7,900	3,400	11,300	X
	2100S	16	T	16	36	8/73	1,825	1,425	3,250	X
	2114/15/16	16	T	9	29	11/66	2,495	1,145	3,640	X
	1000-M (MX-M, K)	16	T	2	16	6/74	7,979	6,224	14,203	8,100
	1000-E (MX-E)	16	T	6	22	1/77	7,060	7,040	14,100	
	1000-F	16	T	12	40	9/78	2,270	1,403	3,673	
	1000-L	16	T	2	10	6/79	242	207	449	
	3000-I	16	S	100	200	11/72	1,420	880	2,300	X
	3000-II	16	S	100	200	4/76				X
	3000-III	16	S	92	200	6/78	1,195	1,105	2,300	500
	3000-33	16	S	58	135	1/79	700	600	1,300	1,000
	3000-30	16	S	50	105	10/79	200	150	350	350
	3000-44	16	S	109	200	3/81	0	0	0	NA
	Total						33,286	23,579	56,865	
HIS-GE/PAC	30	8	T	7	35	5/69	225	50	275	X
	3010, 2	16	T	13	90	5/70	25	1	26	X
Honeywell	112	12	T	5	10	11/69	222	48	270	X
	116/316/416/516	16	T	8	62	10/66	2,405	1,295	3,700	X
	700 Series	16	T	16	65	6/72	1,954	1,531	3,485	X
	164X Series	16	T	144	440	12/69	20	8	28	X
	6/06	16	T	6	25	1/76				
	6/23	16	T	6	25	/78				
	6/33	16	T	4	40	5/78	2,930	1,980	4,910	2,500
	6/34	16	T	4	18	1/76				
	6/36	16	T	4	35	1/76				
	6/43	16	S	7	110	1/77				
	6/47	16	S	19	160	8/78	3,570	2,420	5,990	2,100
	6/53	16	S	19	145	5/78				
	6/57	16	S	44	225	/78				
	Total						11,351	7,333	18,684	4,600
Information Technology, Inc.*	4900/10	16	T	10	20	10/65	25	0	25	X
IBM	Series/1	16	T	5	30	11/76	13,800	5,800	19,600	8,200
Intersil	LSI 8	12	T	3	7	7/80	50	50	100	NA
Keronix	IDS-16/8	16	T	4	5	4/74				
	IDS-16/10	16	T	3	5	4/74	2,900	270	3,170	20
	IDS-16/12	16	T	3	4	4/74				
Lear Siegler*	VDP-410	16	T	4	4	10/78	100	50	150	X
Lockheed Electronics Company, Inc.*	LEC-16	16	T	11	18	3/69	2,590	435	3,025	X
	SUE	16	T	6	11	9/72	2,878	472	3,350	X
	Total						5,468	907	6,375	
Microdata Corp.	400	8	T	3	4	1/70	155	0	155	X
	800 Series	8	T	6	11	5/69	2,055	1,380	3,435	X
	1600	8	T	5	11	2/72	6,825	1,177	8,002	75
	3200/3230	16	S	8	14	3/74	115	110	225	X
	Micro One	8	M	1	3	11/74	800	120	920	X
	Total						9,950	2,787	12,737	75
Minicomp*	MD-708	8	T	5	7	8/70	50	0	50	X
Modular Computer Systems	Modcomp I	16	T	2	9	10/71	698	142	840	X
	Modcomp II	16	T	13	41	3/71	2,187	534	2,721	2
	Modcomp III	16	S	13	44	12/70	72	5	77	X
	Modcomp IV	16/32	S	48	100	5/74	339	130	469	X
	Classic 7810	16	T	8	25	5/79	269	25	294	8
	Classic 7820	16/32	S	16	38	12/80	4	0	4	12
	Classic 7830	16/32	S	29	55	9/79	139	30	169	61
	Classic 7840	16/32	S	28	70	12/80	8	0	8	58
	Classic 7860	16/32	S	38	100	1/78	134	52	186	9
	Classic 7870	16/32	S	64	128	8/78	201	79	280	55
	Total						4,051	997	5,048	205

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AS OF JANUARY 1, 1981

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	SIZE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	CUMULATIVE NUMBER SHIPPED IN U.S.	CUMULATIVE NUMBER SHIPPED OUTSIDE U.S.	CUMULATIVE NUMBER SHIPPED TOTAL	ORDERS FOR 1981 INSTALLATION
Motorola Communications Division*	MDP-1000	8	T	8	19	2/69	75	0	75	X
New England Digital Corp.*	Able Series 40	16	T	8	10	6/77	100	25	125	X
	Able Series 60	16	T	10	12	6/78	75	10	85	X
	Total						175	35	210	
Omnitec (Bit)*	480	8	T	6	17	12/66	195	3	198	X
	483	8	T	9	33	1/70	115	40	155	X
	Total						310	43	353	
Perkin-Elmer Corp.	1	8	T	4	11	9/70	210	77	287	X
	2, 3, 4, 5	16	T	9	21	5/67	614	153	767	X
	13, 15, 16, 18	16	T	15	33	9/69	14	14	28	X
	50, 55	16 + 1	T	7	33	4/72	133	40	173	X
	70	16	T	9	65	12/71	1,060	342	1,402	X
	74	16	T	3	34	2/73	300	56	356	X
	80, 85	16	T	15	50	7/72	70	18	88	X
	5/16	16	M	1	5	1/77	269	78	347	X
	6/16	16	T	2	15	1/76	1,700	743	2,443	300
	7/16	16	T	3	18	2/74	3,732	840	4,572	120
	8/16	16	T	4	25	1/77	506	189	695	150
	7/32	32	S	10	35	7/74	1,421	448	1,869	200
	8/32	32	S	55	160	6/75	650	264	914	125
	Series 16	16	T	5	22	4/79	360	135	495	550
	3220	32	S	34	90	5/79	364	247	611	500
	3240	32	S	85	185	10/79	108	52	160	220
	3230	32	S	47	120	3/81	0	0	0	NA
	Total						11,511	3,696	15,207	
Point 4 Data Corp.[b]	Point 4 Mark 5	16	T	5	7	3/79	1,600	400	2,000	1,800
	Point 4 Mark 3	16	T	NA	3	5/81	0	0	0	NA
	Point 4 Mark 8	16	T	NA	9	5/81	0	0	0	NA
Prime Computer	100	16	T	6	12	4/73				
	200	16	T	7	22	11/72				
	300	16	S	12	58	9/73	1,500	1,340	2,840	20
	400	16	S	62	207	6/76				
	500	16	S	126	330	6/76				
	150, II	32	S	35	NA	6/80				
	250, II	32	S	50	NA	6/80				
	350	16/32	S	31	116	7/78				
	450	16/32	S	50	75	2/79	1,920	1,240	3,160	3,500
	550	16/32	S	70	125	2/79				
	650	16/32	S	95	165	2/79				
	750	32	S	130	200	7/79				
	Total						3,420	2,580	6,000	3,520
Raytheon Data Systems	703	16	T	13	23	10/66	179	33	212	X
	704	16	T	10	18	3/70	700	200	900	X
	706	16	T	19	30	5/69	75	17	92	X
	RDS-500	16	S	17	21	12/73	1,125	265	1,390	NA
	Total						2,079	515	2,594	
Redcor Corp.*	RC 70	16 + 2	T	15	30	7/68	100	40	140	X
SCI Systems, Inc.	Mercury 3	16	T	6	13	/78	450	50	500	240
Sperry-Univac	5201	16	T	6	13	9/68	330	170	500	X
	620/a	16	T		75	12/65	120	30	150	X
	520/f, f-100	16	T	10	23	6/70	470	220	690	X
	620i	16/18	T	10	20	12/65	920	380	1,300	X
	620/L + 100C	16	T	5	12	2/71	720	320	1,040	X
	620/L-100	16	T	6	14	6/72	1,093	554	1,647	NA
	H620/i, R622/i	16/18	T	15	29	6/69	180	80	260	10
	V-72	16	T	10	45	2/74	1,090	443	1,533	NA
	V-73	16	S	16	45	11/72	1,190	530	1,720	X
	V-74	16	S	40	80	5/74	210	90	300	X
	V-75	16	S	39	80	8/75	120	50	170	X
	V-76	16	S	8	16	1/76	734	319	1,053	NA
	V-77-200	16	T	2	15	1/77	852	246	1,098	NA
	V-77-400	16	T	5	28	12/76	306	230	536	NA
	V-77-500	16	S	30	60	3/81	0	0	0	600
	V-77-600	16	S	18	65	3/77	1,063	310	1,373	NA
	V-77-700	16	S	34	90	3/81	0	0	0	650
	V-77-800	16	S	22	95	3/79	380	166	546	NA
	Total						9,778	4,138	13,916	
Systems Computer Corp.*	1000	8	T	1	4	1/71	400	200	600	X
Systems Engineering Laboratories	32/30, 35	32	S	30	80	9/76	150	50	200	
	32/55, 57	32	S	50	125	8/75	550	170	720	
	32/75, 77	32	S	70	150	3/78	550	100	650	400
	32/27	32	S	25	60	1/81	0	0	0	
	32/87	32	S	250	350	/81	0	0	0	
	Total						1,250	320	1,570	
Tandem Computer, Inc.	T16	16	S	95	140	5/76	1,152	386	1,538	NA
	NonStop II	16	S	144	200	1/81	0	0	0	NA
	Total						1,152	386	1,538	
Telefile Computer Products	TCP-16/5	16	T	12	15	9/77	130	30	160	135
Texas Instruments	960-A/B	16	T	14	30	12/71	3,400	1,600	5,000	X
	980-A/B	16	S	17	40	10/72	3,450	1,550	5,000	X
	990/4	16	M	1	8	6/76	7,200	2,550	9,750	1,200
	990/10	16	T	20	25	3/76	9,800	4,150	13,950	5,500
	990/5	16	M	3	8	3/79	1,450	750	2,200	1,840
	990/12	16	S	29	70	11/79	725	305	1,030	1,200
	Total						26,025	10,905	36,930	9,740
Unicom, Inc.*	CP-8	8	T	3	8	2/70	343	165	508	X
Unicomp*	Comp-16	16	T	11	29	6/70	26	0	26	X
	Comp-18	18	T	12	38	8/70	38	0	38	X
	Total						64	0	64	
Westinghouse Electric	P-50	14	T	16	23	8/64	182	40	222	X
	P-2000	16	T	10	27	8/69	111	90	201	X
	2500 F	16	T	10	30	11/71	339	125	464	10
	Total						632	255	887	10
Xerox*	CE-16, 16/A	16	T	8	23	6/69	35	10	45	X
	Sigma-2	16	T	24	125	12/66	170	80	250	X
	Total						205	90	295	
TOTAL							473,426	218,599	692,025	

Notes

a) Two Pi Corporation was purchased by Four-Phase Systems, Inc. during 1980.
b) Corporate name changed from Educational Data Systems, March 1, 1980.
NA) Data is not available.
X) Indicates minicomputer models not in new production.

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• IN A MOVE DESIGNED TO KEEP PCM USERS in the IBM software fold, and perhaps motivated slightly by pressure from antitrust charges filed abroad, IBM indicated it will offer its System Installation Productivity Options (IPO) to users of plug compatible hardware, thus supporting them the same as IBM users. With IPOs, a user receives updates tailored to the assemblage of his system's software. IBM may want to round up PCM users into the IBM software fold so the lure of a new operating system might be attractive to those users. National Advanced Systems withdrew its complaint to the European Economic Community regarding the unavailability of IPOs to PCMs.

• IBM MAKES WAY FOR System/36? IBM cut the purchase price of the System/34 by $5,000 for those with 8.6- and 13.2 Mbyte disk and lopped $6,000 off the 27.1 Mbyte model, effective immediately. Henceforth these 34s will be available only on a purchase basis. Perhaps because these models were available on two year leases, IBM is trying to avoid having new systems turned back in prior to full payback. Similarly, there is a "starter" set of programs carrying a one-time charge, instead of the customary monthly lease. Utilities and system support program and Basic or RPG II cost $3,240 or $3,000. These are designed for systems with up to four CRTs, and four printers without communications. IBM also unveiled business applications software for the 34.

• SYSTEM/38 MOD 4 LOOKS LIKE NEW LOW END of that line. IBM cut 16% off of purchase, lease, and rental prices of the 38/3. The /4 has about 35% greater internal performance than the /3, and the same 200 nsec control storage as the /5 and also supports the 3370 drive. Maximum memory is 2 Mbytes. The /4 is upgradeable from the /3 and to the /5. Typical configuration, with 1.5 Mbytes, 635 Mbyte disk, 15 workstations, and a line printer, is $202,100 or $6,078/mo. Should give some superminis a run for the money. The new tag on a /3 with four workstations is $112,350. IBM also apparently likes volume discounts for purchases -- it is offering 6% to 15% discounts on major components of the 5280 distributed data system and the 5520 administrative system.

• XEROX PLAYS BALL IN DESKTOP REALM -- the question is, when does IBM get off the bench? In a blatant move for market share, Xerox's Office Products Division announced the 820 "worm," a $2,995 desktop ($5,895 with printer) that is a state-of-the-commerce product basically much the same as other CP/M-based systems with basic word processing software; it uses many Xerox components.

Why is this news? Xerox will support it on several levels, market it directly to the Fortune 500 and use the 820 to open every conceivable avenue of distribution to Xerox. (There was a hint Xerox is attempting to sign a major retailer.) Obviously a first salvo with plans to see the Xerox name on more desks. EDP/IR has a hunch this is the machine that is supposed to make OPD profitable in 1981. Xerox plans to ship "lots of tens of thousands" by year-end. Software is separate, but on a one-time fee basis -- CP/M $200 and word processing $500. Uncoincidentally, Wang cut $1,000 off of single quantity Wangwriters bringing the price to $6,400, announced discounts, and said it will add CP/M. Xerox is endowing its 860 with CP/M and 3270.

• TEXAS INSTRUMENTS KILLS BUBBLE memory product line, despite recent announcements of products incorporating bubbles. TI observed bubbles had become merely a niche in the memory market rather than a broad-based segment.

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INTERNATIONAL DATA CORPORATION
FIVE SPEEN STREET
FRAMINGHAM, MA 01701
(617) 872-8200 □ TELEX 95-1168

MEMORANDUM

TO: EDP/IR Subscribers

FROM: Molly Upton

DATE: June 8, 1981

SUBJECT: CORRECTION FOR EDP/IR

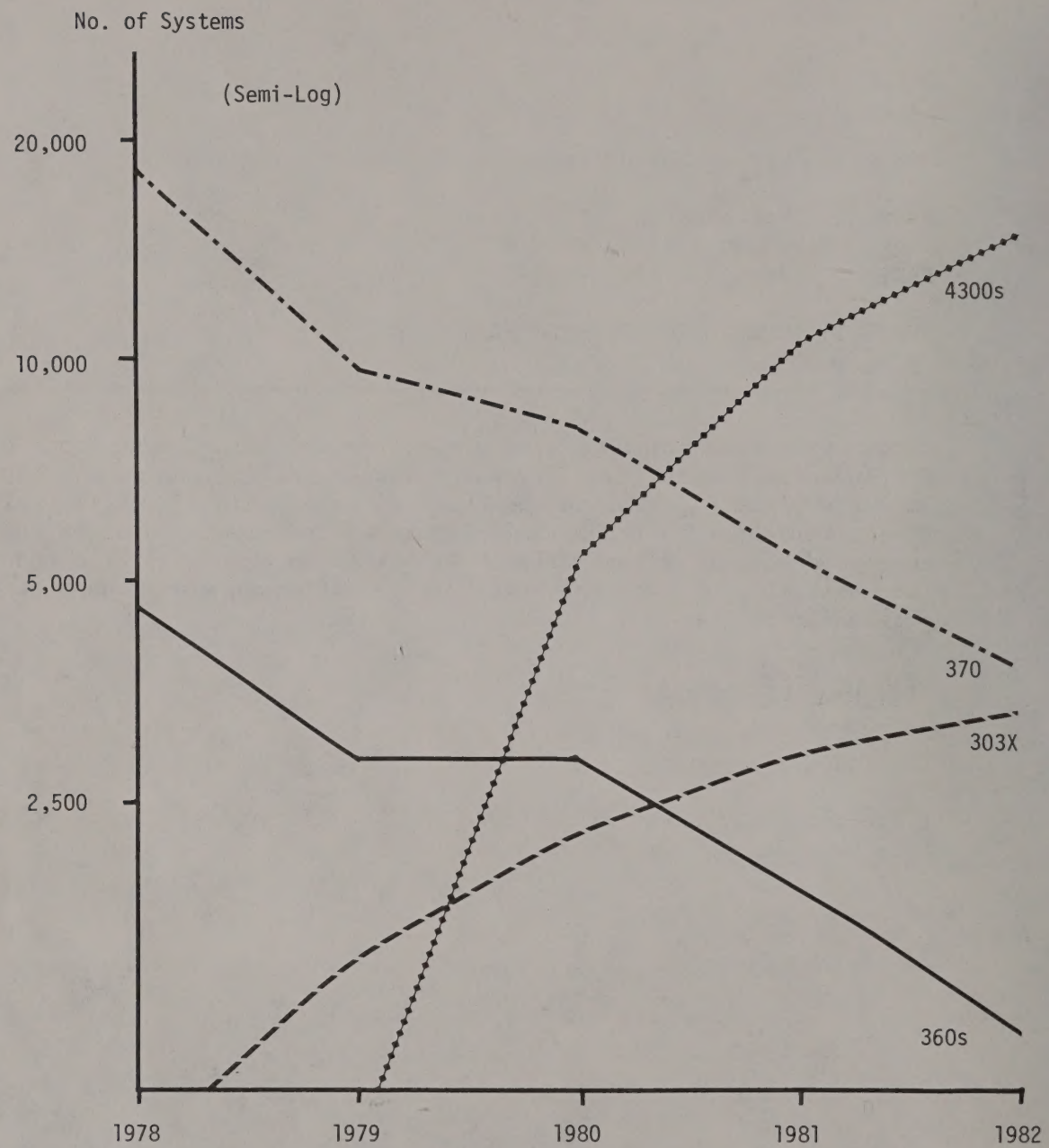
Oops. Once in a while we make a mistake, and in the last issue of the EDP/Industry Report (Vol. 17, No. 1, dated 5/27/81) we made a biggie. It was a plotting error in the chart on page 4 titled U.S. Installed Base of IBM Systems (DPD), 1978-1982. On the reverse side is the corrected chart. Please file it with the issue or otherwise annotate the newsletter -- the new chart tells a different story than the one originally printed.

Molly Upton

Molly Upton, Editor
EDP/Industry Report

P.S. This year's Review & Forecast is so big we have had to split it into two issues. Part I is enclosed.

U.S. INSTALLED BASE OF IBM SYSTEMS (DPD)
1978 - 1982
(Copyright 1981 -- International Data Corporation)



an upgrade. Its base in 1982 should be about 44% of that in 1978, whereas the 138 base will be only about 33% of that in 1978.

The 155/165 populations aren't changing much as their users are generally slow growing. The 158 will be around, as it, like the 148, is an upgrade favorite. However, by 1982 the 3033S should have made a sizeable erosion into its base. And the 168, which has also been a popular upgrade, faces severe competition from the 3033S, which is upgradeable, and about the same price tag.

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EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"The Gray Sheet"

MOLLY UPTON, EDITOR MAY 27, 1981 ● VOL.17,NO.1 P.J.McGOVERN,PUBLISHER

4300 IMPACT CAUSES IBM 360 BASE TO DWINDLE AT LAST AND 370 BASE WANES

Summertime, and it looks as if IBM is foregoing product announcements temporarily in order to give users a chance to digest its big push toward the newer variations of MVS.

Prompted by confirmed reports that early delivery schedules of the newest behemoth, the 3081, are commanding unbelievable premiums, and rumors that IBM would like to implement a volume discount plan for 4300s, EDP/IR takes a look at International Data Corporation's latest user migration study to see how the IBM base is churning.

(Users with early deliveries sold their positions for as much as $350,000 and $500,000, but those asking $750,000 and $1 million were still asking.)

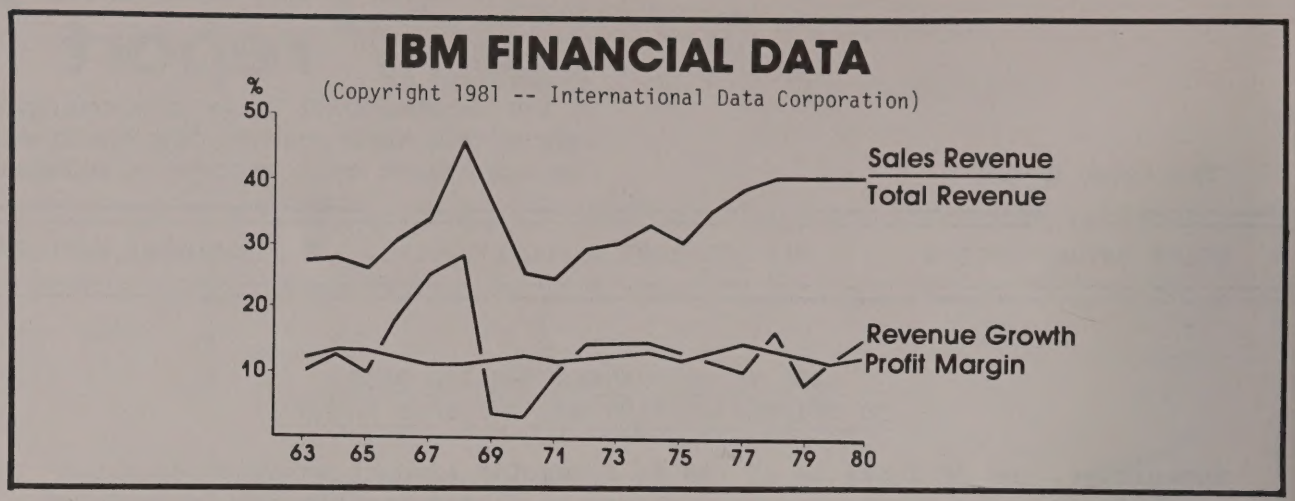
The IBM migration picture is really no surprise; the 4300s are helping eradicate the remainder of the 360 base and shrink the small and medium end of the 370 base. The 303X series is replacing the upper end of the 370.

Users should expect that IBM is changing its game plan. Look for faster product turnover, made possible by a larger percentage of the base on purchase rather than lease, and more rapid product development resulting from advances in technology. The Giant probably does not want to repeat the duration of the 360 series -- now 16 years. EDP/IR expects these future IBM trends:

- More encouragement of purchase rather than lease.
- More frequent product introductions.
- Quantum increase in number of enhancements -- all costing $.

IBM apparently has decided it likes selling systems as a means of generating revenues. But as the proportion of its base on lease declines, it needs to smooth out the profit blips that have occurred in the past in conjunction with popular years of certain models. This means more frequent temptations to users' pocketbooks, in both hardware and software forms. Software revenues will play an increasingly important role in vendors' revenue plans. Further unbundling may help vendors to lower hardware purchase prices.

EDP Industry Report is published in annual volumes of twenty-four issues each by International Data Corporation, Post Office Box 955, Five Speen Street, Framingham, MA 01701. Entire contents ©1981 by International Data Corporation. **Editor,** Molly Upton; **Census Editors,** Paul Arabasz, Lloyd Cohen; **Contributing Editors,** John Gantz, Jack Hart, David Moschella, James Peacock, Nancy Scull, David Terrie; **Circulation Manager,** Mary M. Trayte. Patrick J. McGovern, Chairman, International Data Group. John P. Breyer, President, International Data Corporation. Editorial ideas and information are researched and formulated by the editorial staff. Information and opinions in each issue are based on the best information available, but their accuracy and completeness cannot be guaranteed. **Subscriptions:** One year, $245; three years $590. Single copies priced as indicated on inside pages. Prices for multiple copies on request. Reproduction without written permission is completely forbidden. Telex 95-1168; Telephone **617/872-8200.**

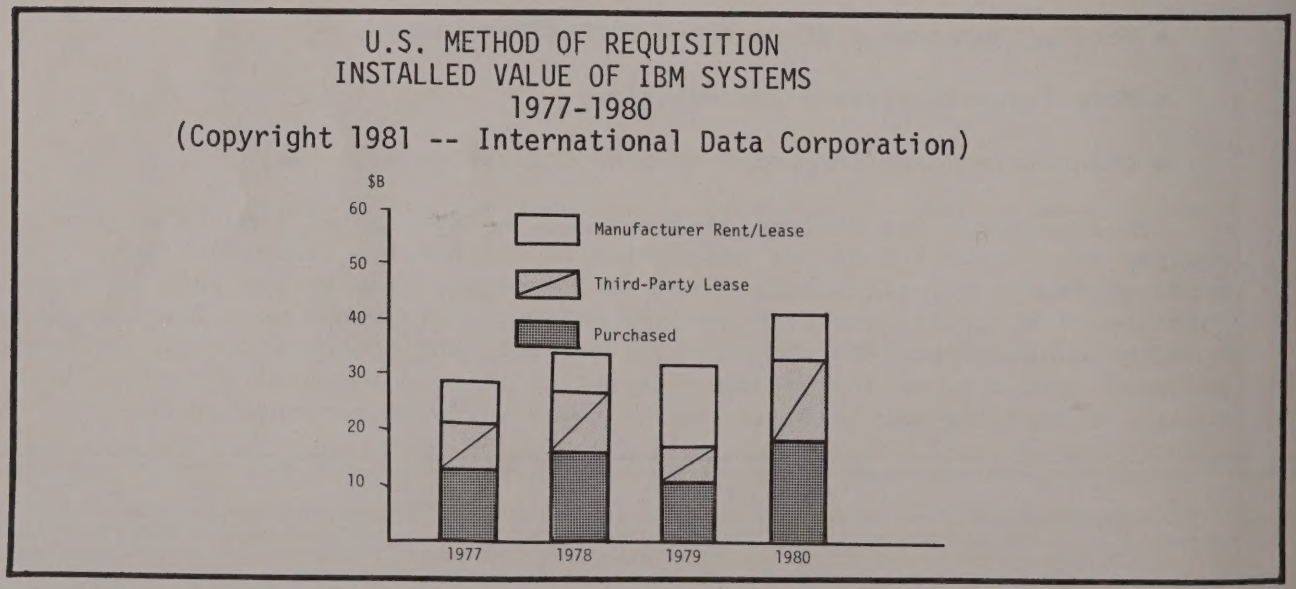


Throughout the general purpose sector, the tight money in 1980 helped third party lessors, and users showed a resurgence of leasing vs. purchase. Despite 1980, the overall trend to purchase is already evident in the ratio of purchase to lease systems within the 303X base compared with the 370 base after the identical number of years following introduction. And certainly the 3033S, which is upgradable (at a price) to the largest 3033, was introduced with the lowest lease/purchase ratio in recent memory.

Looking at the world from the IBM's view as a manufacturer, adding the third party lease base into the purchased base, between 1979 and 1980 the value of the manufacturer's lease base in the U.S. was cut in half, while the purchase base nearly doubled.

3033 shipment shortfall

Comparing users' migration plans in 1979 with those of 1980, IDC found that deliveries of 3033s did not meet expectations. In addition to the obvious impediments of tight money and users' jitters anticipating a better price/performance ratio for the 3081, IBM apparently caused longer delivery times by shutting down at least one 3033 production line, retooling for the



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RESIDUAL VALUES OF IBM SYSTEMS

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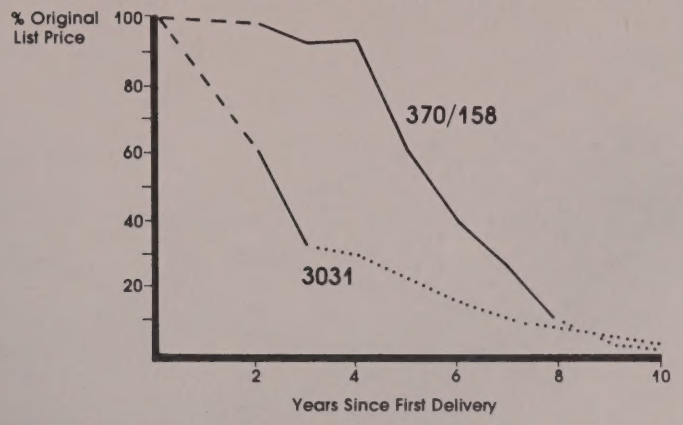

3081. By late 1980, the lead time for a 3033 had stretched to nine months, up from six months in the summer and three months prior to that.

However, 4300 shipments during the year exceeded IDC's expectations, with mid range 370s moving more quickly to the 4300s than the surveys had indicated. IBM's worldwide shipment value rose by 12% -- coincidentally the same rate as worldwide shipments of general purpose computers by U.S. makers -- as 4300s and fairly high shipments of System/38s easily offset the 3033 shortfall.

Paul Arabasz, IDC manager of industry analysis, notes "IBM kept 3033 shipments at a relatively low level as part of an overall attempt to grow shipments at a controlled, steady rate -- rather than in the spurts of the past."

Residual values

Trend lines of residual values of IBM gear will change dramatically as a result of the push toward purchase activity. For instance, the 370/158 line is an example of how residual values held up prior to the purchase-oriented strategy. There were no purchase price cuts during its active life, and in fact there were some price hikes. The gear held at above 90% of original list for the first several years. The first price cut was about 30% at the end of its life and since then used prices have declined rapidly.

In contrast, the 3031 line shows that IBM cut the price even before it was trading on the used market, so the first trades were at about 60% of original list. And then another purchase cut a year later, last November, dropped residual values even further. The dotted lines portray expected patterns.

Declining 360, 370 populations

No surprise that the 360s will dwindle from about 20% of the total IBM base in the U.S. in 1979 to 8% in 1982. The 360/30, 40, 50 and 65 will shrink to less than 30% of their 1978 installations. The /30 and /40 are migrating primarily to the 4331 while the 360/65 is moving to the 4341.

The 370 base, taken as a whole, will shrink from 44% in 1980 when the 4300s began to show up in considerable quantities to 16% in 1982. Generally the smaller the 370, the more likely it is to be replaced by a 4300. The 370/148 is showing relatively strong life as smaller users often select it as

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U.S. INSTALLED BASE OF IBM SYSTEMS (DPD)
1978 - 1982
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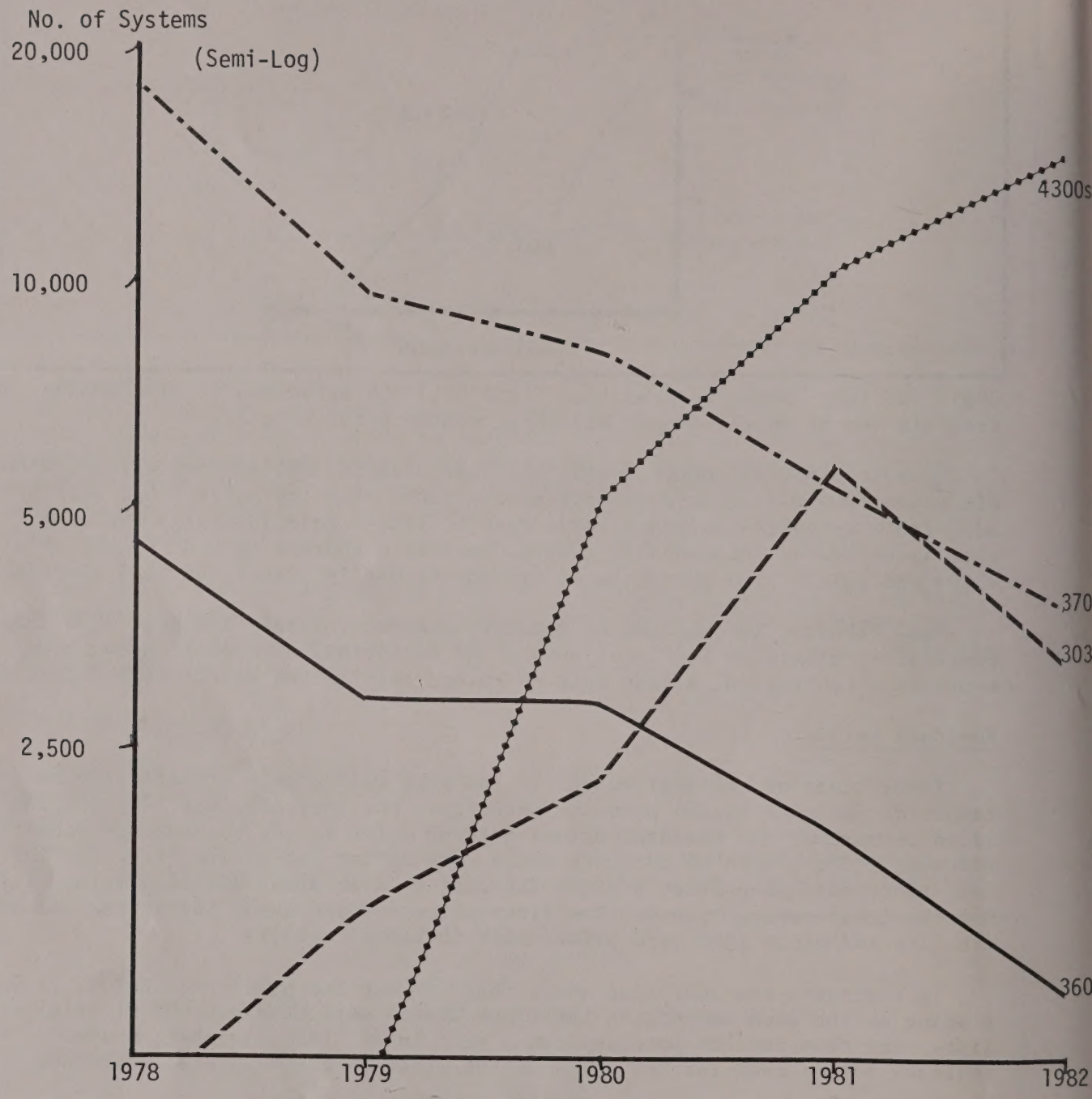

an upgrade. Its base in 1982 should be about 44% of that in 1978, whereas the 138 base will be only about 33% of that in 1978.

The 155/165 populations aren't changing much as their users are generally slow growing. The 158 will be around, as it, like the 148, is an upgrade favorite. However, by 1982 the 3033S should have made a sizeable erosion into its base. And the 168, which has also been a popular upgrade, faces severe competition from the 3033S, which is upgradeable, and about the same price tag.

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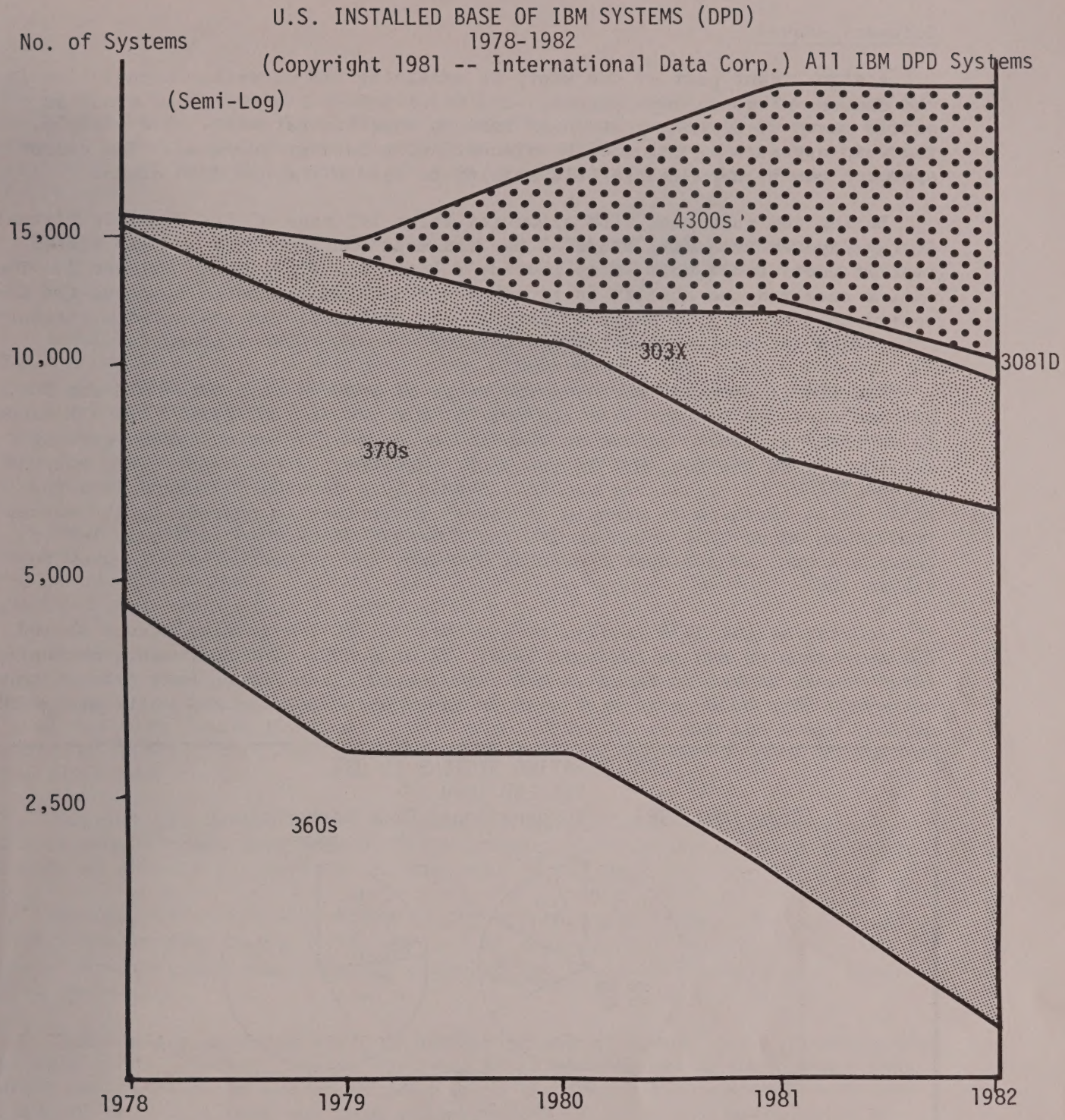

The predicted popularity of 4300s is a force to be reckoned with. For instance, by 1982 there will be more of the announced four models installed than there were 370s at their heyday in 1978, and nearly as many as the number of 370s and 360s combined in 1978.

The 303X series U.S. base will peak in 1981 and number about half of the installed 370 base in 1978. Considering the incremental power in each 303X, that's a lot of horsepower.

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Software shoves

A significant part of the story in examining IBM migration trends lies in the choices of operating systems. The Giant uses its software as a not-so-subtle means of directing its user base to specific hardware. For example, the whip approach is embodied by discontinuing further releases. The carrot approach can be seen in MVS/SP's ability to handle the new 3880 disks.

During the past year, IBM announced three releases of its Multiple Virtual Storage/System Products; MVS/SP 3 has the most functionality and IBM hinted that if users could wait, they shouldn't bother to fiddle with release 2. The 4341-2 received the ability to run VM and MVS/SP concurrently by using the Extended Control Program Support feature. In addition, IBM announced distributed systems license options (volume pricing) to MVS related products.

IBM simultaneously increased the range of systems that offer MVS and DOS. MVS was announced on the 4341 and DOS/VSE was put on the 3033S. But MVS alone is on the 3081, thus indicating that if one is really serious about growing all the way to the top, MVS is the path. However, in the short term, DOS/VSE on the 3033S, an upgradable machine, should lure several 370 users into the 3033S fold. Perhaps an example of users' intentions to upgrade is the marked transition among 3031 users to MVS and MVS/SE. Whereas in 1979 only 14% of these systems had MVS type operating systems, the percentage should grow to 61% in 1981.

Looking at the 303X family, respondents to IDC's migration survey showed 25% were running MVS in 1978; in 1979, 53% used MVS. The 3032 users accounted for the most marked increase in MVS use, jumping from 25% to over 61% of those surveyed. The 3031 users were also in tune, about 20% had MVS while about 90% of 3033 users had MVS as of 1979.

IBM OPERATING SYSTEMS IN USE
YEAREND 1979
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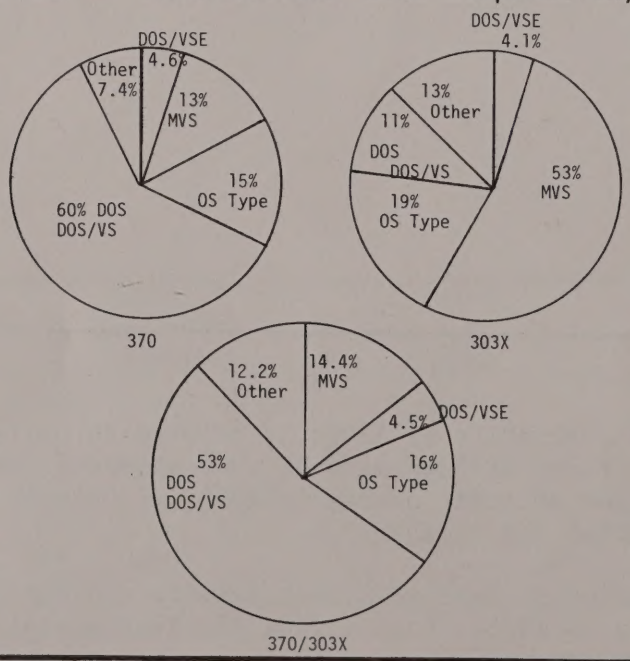

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MINI OEM ORDER REPORTS VARY FROM GLUM TO BUSINESS AS USUAL

While at least one vendor, Microdata Corp., has indicated it is no longer pursuing OEM sales, other mini vendors generally report a grim picture in that arena. However, many hasten to add that inventories have got to be the trimmest ever and that there should be pent up demand that springs loose -- hopefully soon.

High interest rates and the prospect that Reagan's administration may actually do something with tax incentives for capital equipment were cited as factors dampening the market.

Usually the U.S. and Europe manage to see-saw in and out of a slump, and the two avoid hitting the bottom of the trough at the same time. However, it looks like 1981 could be different -- European orders are down and the U.S. economy hasn't recovered to any major degree. The classical national-type economic remedies are still being hotly pursued regardless of the fact that much of the cause of the recession is global in nature, namely the control of oil prices by the Middle East.

While the DP industry has been known to be relatively sheltered from the economy, it remains to be seen whether it can sail through this one as unaffected as in the past. Traditionally, the minicomputer OEM market has been regarded as a bellwether in this regard.

Comments garnered at the recent National Computer Conference generally depict a long-standing slump. Data General observed that its OEM business has been flat for a year, although it characterized North America's position as a "positive flat" while European business is off substantially. Univac's Varian Division reported that business doesn't seem to be down but orders are definitely harder to get.

Computer Automation doubts if business has hit bottom yet, although the OEM division orders have been soft for a year. CA further observed that there can be no more inventory left in customers' pipelines.

HP reported that the downturn in OEM orders began in May 1979 but domestic orders are up from those a year ago and it appears as if the turning point is past. However, Europe has lagged somewhat and the traditionally soft summer lies ahead.

Perkin-Elmer said its best OEM market is the military, which is doing relatively well. However, in the low end, it is phasing out of the 16-bit OEM arena and plans a low end 32-bit system in the fall. The percentage of business PE does with OEMs has been rising to 65% of its total business in the U.S., while abroad the OEM business has been falling as indigenous suppliers get the nod.

Prime Computer indicated that its activity courting the systems builder has resulted in a higher percentage of business to that sector than a year ago and expects that pent up demand will increase business.

DEC cited strength in its traditional markets, particularly the OEM sector, and third quarter revenues rose 34% over the year ago quarter.

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• OOPS. XEROX CANS XTEN PLANS and cites $30 million plowed into the project that was a bit tentative from the start. Industry observers say Xerox plunged into Xten, a plan using cellular radio for short haul transmission, without doing much market research. A Xerox announcement indicated the concept is "technically feasible, but that the economics, for Xerox, are not." It cited other projects for Xerox' resources, plus the high investment required. Xerox said it plans no further investment in Xten but added that most of the costs had been expensed as incurred and would not materially affect earnings. The kiss of death most likely came shortly after Xerox originally announced the scheme when someone in corporate decided to haul the techies from Silicon Valley back East to Stamford, Conn., of all places, where corporate could "conduct" the project. Needless to say, the brains and the guts of the project departed in droves.

• HONEYWELL EQUIPS SMALLER SYSTEMS WITH MANUFACTURING PACKAGES. The HMS/6 runs on the DPS 6/54 and is designed for the single-plant manufacturer as well as for larger firms wanting discrete manufacturing systems that can share a common database with a host. The software integrates both inventory and production control into a single database. The cost for the six modules is $40,000 plus annual license fee of $10,650.

• INTEL PRICES DROP ON SOME CHIPS ... are Ethernet connections next? Although the world may be currently wooed with its 432 chip set for a 32-bit system, Intel is pumping out 8 bit chips and just cut the price of its 8088 by 60% and promised other price cuts will follow. An 8088 now sells for $20 in lots of 100. And the 8089 I/O processor chip received a 50% price cut to $68 for the same quantity. Intel has never been known to keep the prices high when they could be lower. Its conscience may get the upper hand and it may decide to reduce prices on its Ethernet interface units, which are forefathers of the chip sets. Apparently interest and orders at NCC were so great that Intel is considering setting up a production line, in which case the original high prices, based on onesie twosi assembly, are a bit hard on the conscience.

• XEROX, MEANTIME, SIGNS Ungermann-Bass to make its communications servers, known as the 872 and 873. These systems will allow non-Xerox units and the Xerox 860s to exchange information with Xerox devices connected to Ethernet. Ungermann-Bass is marketing an Ethernet-compatible Net/One local net.

• PENNY A BYTE is the price HP is charging for memory on its 1000 L series of microcomputers. HP cited use of 64K RAMs as responsible for the 60% price cut. Traditionally, HP's annual memory price cut has been about 30%.

• TALKING CHECKOUT STANDS are next in the industry's sporadic attempt to replace human courtesy and service with functions handled by a machine. In this era of large supermarkets, clerks rarely call customers by name and now, with the emphasis on speed, rarely call out the prices of items. But National Semiconductor's "positalker" point of sale scanning system has a home-grown speech synthesis chip that will call out prices.

• CORRECTION -- Part of the 20% increase in user spending during 1981 will result from increased rental or lease payments to manufacturers, which should jump 23% from $6.7 billion in 1980 to $8.3 billion in 1981 (EDP/IR, March 24).

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REVIEW & FORECAST
Part I

"The Gray Sheet"

EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

MOLLY UPTON, EDITOR JUNE 3, 1981 ● VOL.17,NO.2 P.J. MCGOVERN,PUBLISHER

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DESKTOPS' GROWTH UNLEASHED; SMALL BUSINESS COMPUTERS REINED IN BY ECONOMY

Despite the blurring of lines between the desktop and small business computers, the market seems to perceive a difference; the popularity of desktops continues unabated while shipments of small business computers are affected by both the economy and product life cycles.

It may be only a slight exaggeration to say that desktops may inherit the earth. Worldwide unit shipments by U.S. makers and international manufacturers with U.S.-based sales offices should grow at a compound rate of 32.7% between 1980 and 1985 -- from 456,000 units to 1.9 million units.

Significantly, the value of desktop shipments by 1982 will exceed the value of annual small business computer shipments. As of 1981, IDC is including independent peripherals in the value of shipments, which will jump from a 50% annual growth rate in 1980 to a 93% rate in 1981.

For those who think desktops are still small potatoes, the worldwide installed value of desktops from U.S. manufacturers was $4 billion in 1980, 40% of the size of small business computers, and will grow to $41.8 billion in 1985, surpassing the value of installed small business computers.

It's a different story for small business computers (SBC). The forecast for worldwide shipments of U.S. based manufacturers' SBCs calls for a more subdued compound rate of 18.6% between 1980 and 1985, 67,000 units to 157,100 units. The value of those shipments will grow at a 20% compound rate from $3.2 billion to $8.2 billion.

	Small Business Computers		Desktops	
	1980	1985	1980	1985
No. Shipments	67,000	157,100	456,000	1,874,000
Value Shipments	$3.2B	$8.2B	$1.7B	$12.9B

While the figures bode growth for both sectors, they include business that will be garnered by Japanese firms having U.S. bases. Thus it's not clear what part of the pie the Japanese will grab.

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VALUE OF WORLDWIDE SHIPMENTS -- DESKTOP AND SMALL BUSINESS COMPUTERS
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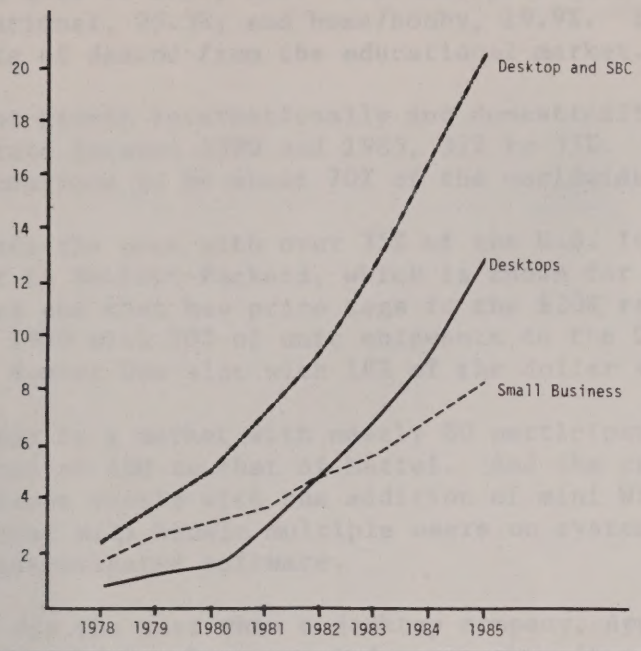

With the popularity of some particular operating systems, the Japanese incursion into this market is all but assured. Products merely have to be CP/M compatible to be on an almost equal footing with much of the rest of the gang. And because much of the software comes from independents, the Japanese can contract with houses such as Peachtree to construct software for their gear that is equivalent to software on other brands. In general, the Japanese have decided to peddle hardware and buy the software. Software will indeed make a difference in this product area as well as in others.

The lines are becoming admittedly blurry between desktops and small business computers. The lack of distinction becomes astounding when one considers that many of the makers of both desktops and SBCs are moving toward 16-bit CPU chips. IDC defines desktop as a system that is: microprocessor-based with its own power supply and encasement (not a board or kit), uses a high level language, and is able to attach peripherals. Its basic system prices usually range between $1,000 and $10,000.

1980 WORLDWIDE DESKTOP UNIT SHIPMENTS OF U.S. VENDORS
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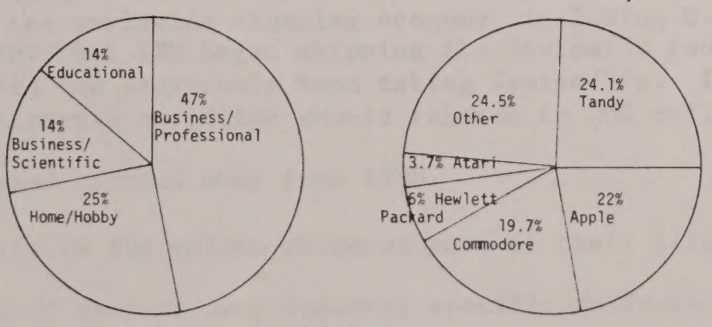

455,722 Units

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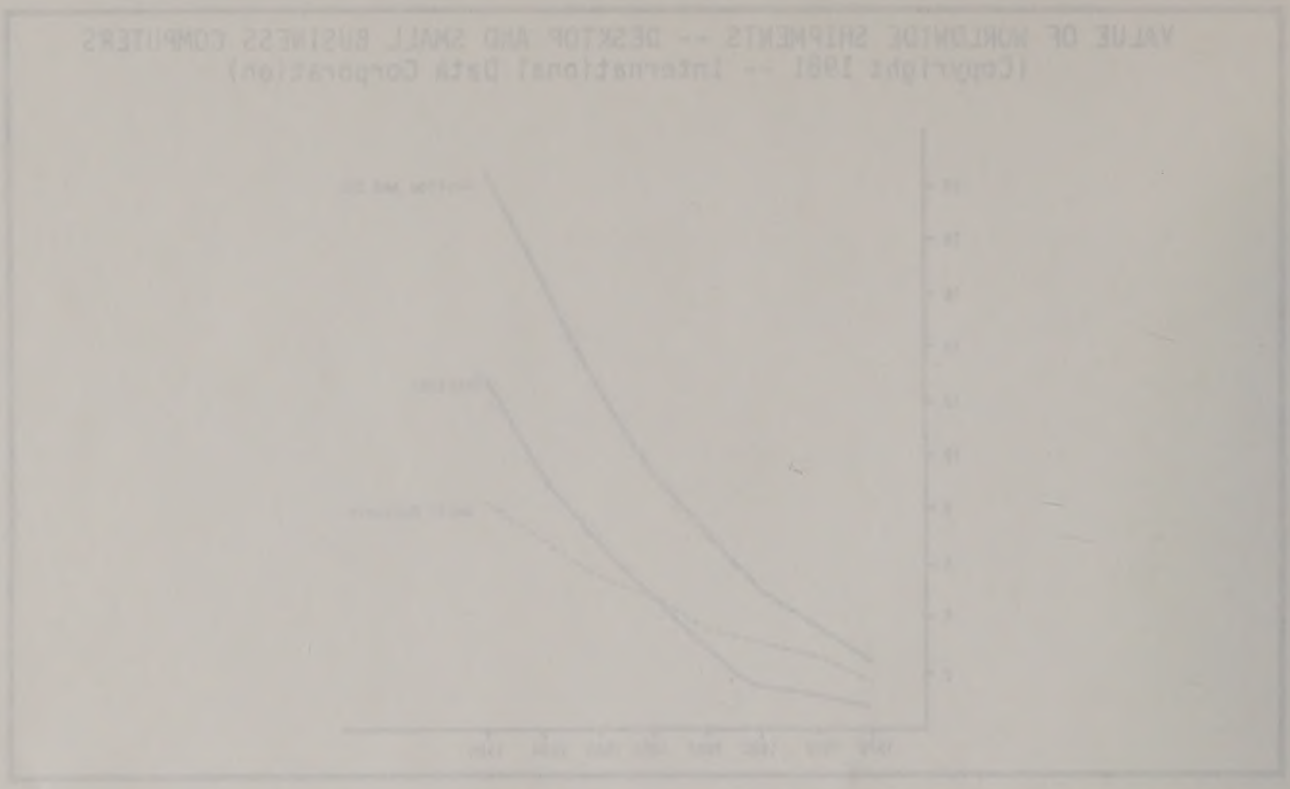

The fastest growing desktop sectors, respectively, and worldwide compound shipment rates from 1980 to 1985, are: business/professional, 39.2%; scientific, 34.1%; educational, 25.3%; and home/hobby, 19.9%. IDC this year increased its estimate of demand from the educational market.

Desktop shipment growth internationally and domestically will be at about the same compound rate between 1980 and 1985, 32% to 33%. Thus the U.S. installed base will continue to be about 70% of the worldwide base.

Tandy still leads the pack with over 35% of the U.S. installed base. The dollar value leader is Hewlett-Packard, which is known for its 9800 desktop family with an upper end that has price tags in the $20K range. Tandy maintained its lead in 1980 with 30% of unit shipments to the U.S. market but Apple garnered the Number One slot with 18% of the dollar value of shipments.

The desktop arena is a market with nearly 80 participants, whose orientations range from that of IBM to that of Mattel. And the capabilities of these systems increase almost weekly with the addition of mini Winchester disks, operating systems that will handle multiple users on systems networked together, and more user-oriented software.

Remember, 1980 was the year when a desktop company, Apple, captured the hearts and pocketbooks of Mr. Everyman and woman when it went public. The public demand for the stock before issuance was incredible. If nothing else, Apple has impacted the public's consciousness about computers. No small mission. Now Apple has found there are some slippery stones to negotiate over the brook separating small, single product companies from larger corporations.

Small business feels economy

The small business sector's growth is determined in large part by the product cycle of IBM's General Systems Division as well as by the economy.

IDC defines a small business computer as: a computer with internally stored data and instructions, at least 4K of memory that is user programmable and is configured with peripherals and applications software. Prices are generally between $20,000 and $100,000 and systems are targeted at business-related applications.

The growth rate of worldwide small business shipments slammed on the brakes in 1980, when it crawled to about 15% compared with the stellar performance in 1979 when it hit nearly 60%. Key factors contributing to the slower rate were the worldwide slumping economy, including U.S. high interest rates, and the fact that IBM began shipping its System/38 (not an SBC), in lieu of which users had previously been taking System/34s. In 1981 small business computer shipments worldwide should rebound to 20% reflecting:

- Pent-up demand carried over from 1980.
- Many products in the volume shipment part of their life cycles.
- Development of easy to use, industry specific software.

The growth rate worldwide over the next 5 years will be in the 18% to 19% range, with the international market showing a faster track record.

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The growth rate of worldwide small business shipments slowed on the heels in 1980, when it crawled to about 13% compared with the stellar performance in 1979 when it hit nearly 60%. Key factors contributing to the slower rate were the worldwide slumping economy, including U.S. high interest rates, and the fact that IBM began shipping its System/32 (not an SBC), in lieu of which users had previously been taking System/34s. In 1981 small business computer shipments worldwide should rebound to 20% reflecting:

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SMALL BUSINESS COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)[a]

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1975	10,600	16,800	400	0.7
1976	22,300	39,100	870	1.6
1977	33,100	72,200	1,280	2.8
1978	42,300	113,000	1,800	4.6
1979	58,400	167,000	2,830	7.3
1980	67,000	230,300	3,240	10.3
1981	80,100	304,500	3,940	14.1
1982	94,600	390,700	4,690	18.4
1983	113,200	490,700	5,660	23.5
1984	133,900	605,100	6,830	29.4
1985	157,100	749,300	8,150	37.0
		UNITED STATES		
1975	7,900	12,400	300	0.5
1976	14,700	27,100	670	1.1
1977	21,700	48,800	830	1.9
1978	26,500	73,800	1,150	3.0
1979	34,200	104,300	1,720	4.6
1980	38,700	139,800	1,930	6.4
1981	46,100	181,800	2,340	8.6
1982	53,500	230,100	2,750	11.1
1983	63,100	285,400	3,260	14.0
1984	73,800	348,200	3,890	17.4
1985	85,600	425,500	4,640	21.7
		INTERNATIONAL		
1975	2,700	4,400	100	0.2
1976	7,600	12,000	300	0.5
1977	11,400	23,400	450	0.9
1978	15,800	39,200	650	1.6
1979	24,200	62,700	1,110	2.7
1980	28,300	90,500	1,310	3.9
1981	34,000	122,700	1,600	5.5
1982	41,100	160,600	1,940	7.3
1983	50,100	205,300	2,400	9.5
1984	60,100	256,900	2,940	12.0
1985	71,500	323,800	3,510	15.3

[a]International manufacturers with U.S.-based sales offices are counted in the U.S. totals, but not international.

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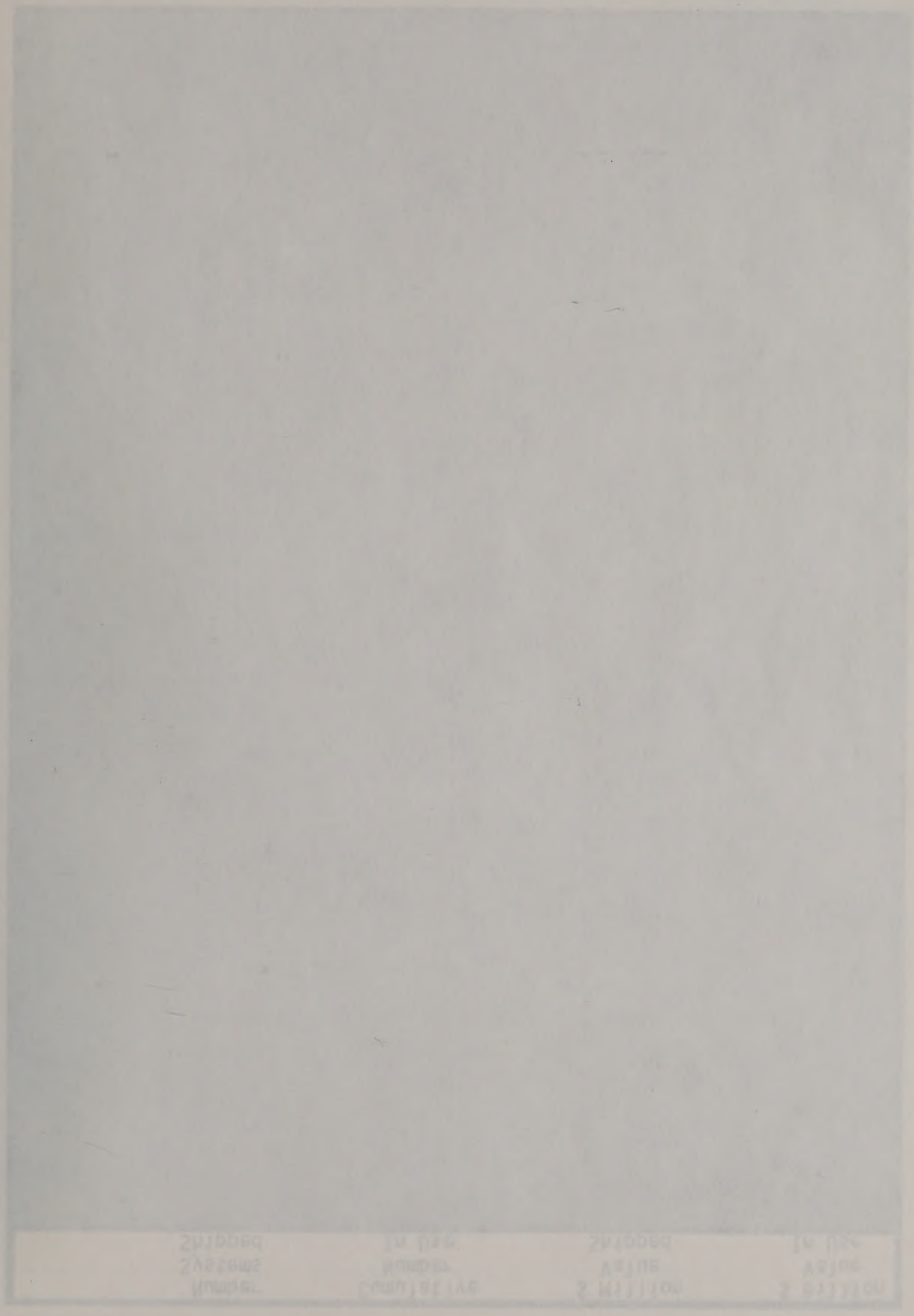

DESKTOP COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)[a]

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1975	4,000	7,000	50	0.1
1976	9,000	16,000	125	0.2
1977	32,000	48,000	247	0.5
1978	164,000	212,000	646	1.1
1979	289,000	501,000	1,165	2.3
1980	456,000	957,000	1,745	4.1
1981	637,000	1,594,000	3,363	7.4
1982	869,000	2,463,000	4,933	12.4
1983	1,149,000	3,612,000	6,985	19.4
1984	1,482,000	5,094,000	9,607	28.9
1985	1,874,000	6,968,000	12,980	41.8
		UNITED STATES		
1975	2,000	4,000	25	*
1976	4,000	8,000	59	0.1
1977	24,000	32,000	171	0.3
1978	128,000	160,000	435	0.7
1979	196,000	356,000	735	1.5
1980	327,000	683,000	1,112	2.6
1981	463,000	1,146,000	2,430	5.9
1982	631,000	1,777,000	3,563	8.6
1983	828,000	2,605,000	5,004	13.6
1984	1,058,000	3,663,000	6,817	20.4
1985	1,324,000	4,987,000	9,056	29.4
		INTERNATIONAL		
1975	2,000	3,000	25	*
1976	5,000	8,000	69	0.1
1977	8,000	16,000	76	0.2
1978	36,000	52,000	211	0.4
1979	93,000	145,000	430	0.8
1980	129,000	274,000	634	1.5
1981	174,000	448,000	933	2.5
1982	238,000	686,000	1,370	3.8
1983	321,000	1,007,000	1,981	5.8
1984	424,000	1,431,000	2,790	8.5
1985	550,000	1,981,000	3,845	12.4

*Less than $.05

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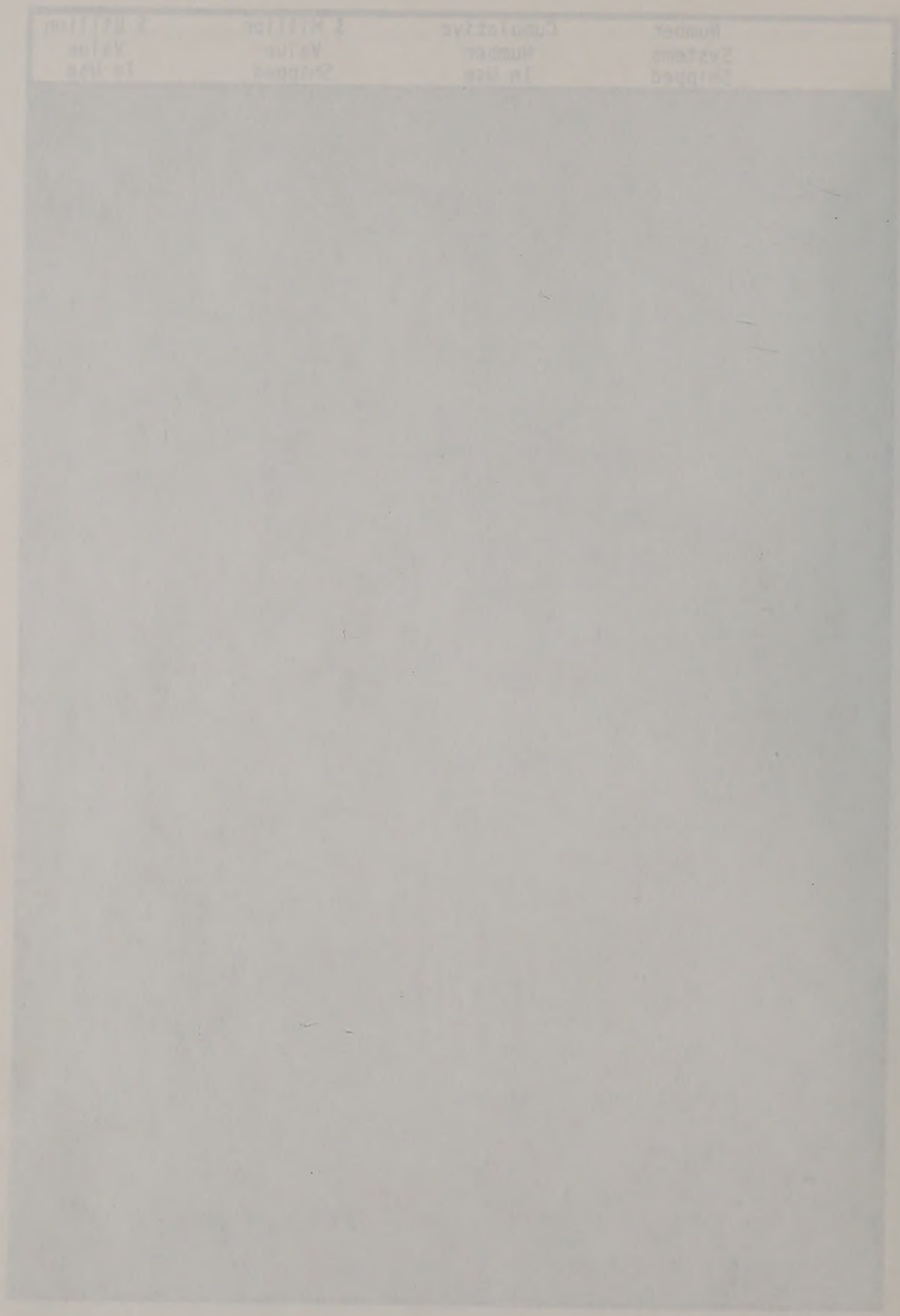

SMALL BUSINESS COMPUTER CENSUS

The categorization of certain computers as "small business computers" is based on marketplace definitions as perceived by IDC. SBCs are those small general-purpose computers marketed to smaller businesses, first-time users, and increasingly to small units of large organizations. They include offerings from the major mainframers (such as IBM's System/32 and 34); products such as DEC's Datasystem/300 from the minimakers but aimed at commercial first-time users; equipment from firms (such as Qantel) that manufacture only SBCs; and products from companies that market systems assembled from others' minicomputers (i.e., systems houses).

AS OF JANUARY 1, 1981

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ORDERS FOR 1981 INSTALLATION
Advanced Information Design*	System 3000	Interdata X/16		24	39	3/75	41	0	41	X
A.M. Jacquard Systems	J 100	NS IMP-16		19	46	8/75	1,220	1,080	2,300	800
	J 500	J 500		12	16	12/78	510	770	1,280	1,080
	Total						1,730	1,850	3,580	1,880
Anderson Jacobson*	1400	AJ 1400	a	16	22	1/70	260	15	275	X
	1520 Series	AJ 1500		19	21	7/77	200	25	225	X
	1560 Series	AJ 1500		30	35	7/77	60	3	63	X
	Total						520	43	563	
Applied Computer Systems*	Smart Alec	8080 A		12	13	1/77	47	17	64	X
Applied Data Communications	Event	Event 2000		13	20	2/77	151	12	163	X
	Clinic 2	Event 2000		19	23	6/79	20	0	20	X
	Event 3000	8080 A		22	22	12/79	6	0	6	NA
	League Master	8080 A		23	23	/80	2	0	2	X
	Total						179	12	191	
Applied Data Processing, Inc.*	Resource 50	Nova 3/4		31	52	9/79	1	0	1	X
	Resource 100	Nova 3/12		41	72	6/79	16	0	16	X
	Total						17	0	17	X
Applied Digital Data Systems, Inc.*	ADDS/Vantage	8080		11	14	7/76	550	400	950	X
Astrocom	Series 760	Z80		16	20	6/79	10	0	10	NA
Ball Computer Products*	DASL	Nova 2/10		38	40	6/75	3	0	3	X
Basic Four Corporation	200	BFC 1340		25	29	2/78	383	512	895	NA
	350	BFC 1300, Microdata	b	34	34	9/71	500	576	1,076	X
	400	BFC 1300, Microdata	b	37	45	9/71	1,712	1,739	3,451	X
	410	BFC 1300		33	41	10/78	1,146	1,378	2,524	NA
	500	BFC 1300, Microdata	b	39	50	7/72	100	82	182	X
	510	BFC 1345		44	61	/80	20	10	30	NA
	600	BFC 1300, Microdata	b	51	65	3/75	300	308	608	X
	610	BFC 1320		51	66	1/78	1,197	879	2,076	NA
	700	BFC 1320		115	130	/77	109	99	208	X
	730	BFC 1350		95	124	6/78	380	270	650	NA
	Total						5,847	5,853	11,700	
Basic Time	B-100	Digidyne		16	16	7/79	110	10	120	NA
	B-200	Digidyne		20	20	11/79	25	5	30	NA
	Total						135	15	150	
Billings Computer Company*	BC 104	8080A		12	22	/77	400	0	400	X
Binary Data Systems	Award	Eclipse S/130, S/140,		150	250	/75	10	0	10	3
	Nemoshare	Eclipse S/130		125	150	/78	6	0	6	3
	GBS	Eclipse S/130, S/140, Nova 4		75	125	/75	40	0	40	X
	HemoCare	Eclipse S/140		125	150	3/81	0	0	0	6
	Total						56	0	56	
BRD, Inc.*	Dolphin	6800		18	20	6/77	400	30	430	X
	Purpose	6800		10	13	1/78	160	5	165	X
	Total						560	35	595	
Briareus	Briareus	EDS Point 4		23	38	1/76	115	0	115	55
Broadcast Management Concept	Mesa Two	Nova 4	c	50	73	4/78	60	0	60	30
Burroughs	B 80	B 80		17	29	11/76	6,100	9,900	16,000	3,100
	B 90	B 90		18	33	12/79				
	B 700	B 700		26	68	3/73	2,200	1,700	3,900	X
	B 800	B 800		35	51	5/77	4,200	2,400	6,600	3,400
	B 900	B 900		61	76	8/80	150	100	250	300
	Total						12,650	14,100	26,750	6,800
Business Controls Corporation	System 80	PDP-8/a		25	40	6/71	60	0	60	
	Business Control System	PDP-11/23/34/44/70, VAX		40	80	6/75	101	12	113	
							161	12	173	
Business Systems Products*	Adviser	C.A. Syfa		42	50	7/76	111	0	111	
Cado	Cado System 20	Intel 8080		12	16	1/78	500	150	650	X
	Cado System 40	Intel 8080		18	20	4/76	250	60	310	X
	Cado System 20/4, 20/24	Intel 8085		16	27	6/78	2,415	439	2,854	
	Cado System 40/4, 40/44	Intel 8085		20	37	6/78	65	375	440	2,800
	Cado System 20/2, 20/22	Intel 8085		15	16	7/79	206	205	411	
	Cado CAT System	C.A.T.		14	29	5/80	245	20	265	
	Total						3,681	1,249	4,930	2,800

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Cascade Data, Inc.	80/20, 30, 40	Concept		28	42	1/70	50	0	50	X
	Concept II	Concept		27	35	6/75				NA
	Concept III	Concept		32	39	1/78	334	15	349	NA
	Concept IV	Concept		17	19	4/78				NA
	Total						384	15	399	
Centurion Computer Corp.	Centurion 1-A	CC-205	d	18	19	/77	60	0	60	X
	Centurion II-A	CC-205		27	30	/75	95	0	95	X
	Centurion III	CC-205		30	36	/74	600	45	645	135
	Centurion Ser. 100	CC-205		15	15	/79	124	20	144	35
	Centurion Ser. 200	CC-205		27	27	/79	116	10	126	75
	Centurion Ser. 6000	CPU 6		18	35	1/80	100	20	120	100
	Total						1,095	95	1,190	345
Century Computer Corp.	C-400	C-200, 400		34	45	3/75	204	64	268	NA
	C-700	C-200, 400		38	55	6/76	78	11	89	40
	C-900	C-400		27	40	4/77	127	67	194	NA
	C-1000	C-400		40	50	6/77	72	10	82	25
	Opus III	C-200		15	22	2/71	560	110	670	X
	Total						1,041	262	1,303	
Cincinnati Milacron*	George 40	CIP/2200B		16	20	2/77				X
	George 60	CIP/2200B		26	34	/76				X
	George 70	CIP/2200B		26	35	/76	670	150	820	X
	George 80	CIP/4400		43	60	12/76				X
	Other	CIP/2200B		23	34	/74				X
Clary Data Systems*	404	Clary		6	30	1/70	100	32	132	X
Complete Computer Corp.	10, 11, 12	Nova 3/12		34	44	3/74	22	0	22	9
	14, 16, 18	Nova 3/12, Nova 4/X 45		58	10/76	29	0	29	X	
	20, 22, 24	Nova 3/12, Nova 4X		58	74	9/77	8	0	8	X
	40, 44	Nova 4X		48	65	1/80	18	0	18	4
	Total						77	0	77	13
Compucorp*	402	Compucorp 3000		13	15	1/76	15	455	470	X
	450	Compucorp 3000		20	22	4/76	40	115	155	X
	Total						55	570	625	
Computer Hardware, Inc.	2120	CHI		15	50	5/75	10	0	10	X
	2130 C	CHI C		32	75	7/74	350	4	354	4
	2130 D	CHI D		44	120	1/78	10	1	11	3
	3230	CHI		15	50	6/76	100	0	100	48
	4210	CHI		13	13	9/77	4	0	4	2
	4250	CHI		37	45	6/78	7	0	7	1
	Total						481	5	486	58
Computer Interactions Inc.	Compo II-B	PDP-8/e,f,m		40	55	11/72	240	0	240	NA
	Compo II-11	PDP-11		40	55	6/75	230	0	230	NA
	Word Pro II	PDP-8a, Nova, HP		13	19	2/77	350	0	350	NA
	Total						820	0	820	
Data General	CS/10	MicroNova		11	13	11/80	30	20	50	NA
	CS/20	MicroNova		11	20	7/78	180	120	300	NA
	CS/30	MicroNova		21	25	8/79	700	200	900	NA
	CS/40	Nova 3/12		33	40	10/77	600	400	1,000	NA
	CS/50, CB50	MicroNova 4S, 4X		32	65	/80	300	100	400	NA
	CS/60	Eclipse		40	75	7/78	300	100	400	NA
	CS/70	Eclipse		36	43	11/80	24	16	40	NA
	Design Data EC300	Eclipse C/300	e	60	150	3/76	50	10	60	X
	Design Data N312	Nova 3/12	e	31	75	8/75	120	10	130	X
	Synergist 1500	MicroNova	f	8	24	/76	45	5	50	NA
	Synergist 1550	MicroNova	f	14	21	7/78	65	5	70	NA
	Synergist 2500	Nova 3/12	f	27	40	/76	320	15	335	NA
	Synergist 3700	Nova 3/D	f	40	60	/76	40	5	45	NA
	Total						2,774	1,006	3,780	
Decision Data Computer Corp.*	System/4	System/4		23	37	8/76	15	0	15	X
Diablo Systems, Inc.	3200	8080	g	19	23	1/77	1,600	2,100	3,700	NA
Digital Equipment Corp.	Datasystem 300	PDP-8, PDP-11		14	30	/72	7,900	5,100	13,000	3,100
	Datasystem 500	PDP-11		58	115	/72	1,750	1,750	3,500	2,300
	DEC Station 78	PDP-8		8	11	9/78	1,400	900	2,300	1,100
	DEC Station 88	PDP-8A		12	15	3/78				
	Data System 700	VAX 11/750		90	111	1/81	0	0	0	NA
	Total						11,050	1,750	18,800	
Digital Systems Corp.	Galaxy/5	Galaxy/5		90	120	1/76	32	0	32	
	Galaxy/3	Galaxy/3		50	65	1/80	4	0	4	12
	Total						36	0	36	
Dimis, Inc.	Total 100	Modcomp II, Classic	h	110	155	6/74	44	0	44	NA
Display Data Corp.	Insight	Microdata 1600/30		38	59	1/74	1,000	12	1,012	400
	ELS System	Microdata 1600/30		27	33	5/78	250	0	250	X
	Total						1,250	12	1,262	400
DTC	Task Master	8080		17	19	9/78	25	90	115	X
	Micro 210	8085		33	33	8/79	15	30	45	NA
	Total						40	120	160	
Evolution Computer Systems Corp.	Series I	Multi 6	i	65	77	11/73	206	28	234	X
	Series II	Multi 6		88	97	10/77	150	10	160	150
	Total						356	38	394	150
Financial Computer Corp.*	System 111/6	System III		19	25	9/77	28	0	28	X
	System 111/8	System III		23	32	9/77	22	0	22	X
	System 111/10	System III		30	45	1/75	440	55	495	X
	Total						490	55	545	
Gemini Information Systems	Gispac/1	Series I		54	66	4/78	25	0	25	12
	Gispac/16	Perkin-Elmer/16		54	55	4/76	42	0	42	4
	Gispac/32	Perkin-Elmer/32		97	110	4/76	38	0	38	25
	Total						105	0	105	41
General Automation	GM-130/2	SPC-16/45		28	28	12/74	150	350	500	X
	GM-130	SPC-16/45		30	38	12/74	80	180	260	X
	GM-140	SPC-16/65		48	80	1/75	7	18	25	X
	440-DS	GA-16/440		38	70	1/76	35	65	100	X
	460-DS	GA-16/460		35	80	11/78	10	30	40	X
	InstaCode	GA-16/230		34	34	6/80	2	0	2	30
	Total						284	643	927	30
General Information Systems	GIS-350 ABLE	PDP-11/34		36	40	1/76	20	0	20	X

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General Robotics Corp.	Gemini Series	LSI-11		10	21	7/76	200	200	400	200
	Tristar Series	LSI-11		11	22	7/76	100	100	200	100
	Pegasus Series	LSI-11		18	39	9/77	150	150	300	150
	Scorpio	LSI-11		7	10	7/81	0	0	0	200
	Total						450	450	900	650
GRI Computer Corp.	System 99	GRI 99/50		30	35	11/74	196	88	284	X
	System 99/E	GRI 99/52		43	50	11/77	35	15	50	X
	GRIP	GRI		30	30	11/78	25	0	25	100
	Total						256	103	359	100
Hewlett-Packard	HP250	HP250		24	39	9/78	800	1,200	2,000	NA
	HP300	HP300		30	55	9/78	180	270	450	NA
	Total						980	1,470	2,450	
Honeywell	PPS 6/X	DPS 6/X		21	NA	/81	0	0	0	NA
Infotecs	IMP	IM 6100		10	15	9/77	607	104	711	750
	CC2	IM 6100		16	22	1/80	550	40	590	
	Total						1,157	144	1,301	
IBM	System/32	IBM S/32	j	27	42	3/75	6,800	5,000	11,800	X
	System/34	IBM S/34		35	66	12/77	31,000	15,000	46,000	18,000
	Total						37,800	20,000	57,800	18,000
International Computing Corp.*	System 95/99	Nova 2/10		24	35	10/72	9	0	9	X
Kalbro Computer Services	BDS 500	Microdata 1600	k	30	48	3/77	40	0	40	
	BDS 1000	Microdata 1600		35	55	6/72	80	0	80	35
	BDS 2000	Microdata 1600		43	73	10/73	93	0	93	
	BDS 4000	Microdata 1600		51	85	10/79	8	0	8	
	Total						221	0	221	
Keydata	Unity Series	Nova 3/4, 3/12, 3D		48	80	4/79	35	1	36	NA
Lockheed Electronics Company, Inc.	System III	Lockhead SUE		30	50	1/73	465	130	595	X
Logical Machine Corp.	ADAM I	ADAM		30	35	4/75	479	547	1,026	NA
	TINA	TINA		18	20	12/78	287	829	1,116	NA
	ADAM II	ADAM		25	30	10/79	38	220	258	NA
	GOLIATH	GOLIATH		35	37	11/80	2	15	17	NA
	Total						806	1,611	2,417	
Martin Wolfe, Inc.*	Mesa Two 7000	DCC-116		54	81	12/71	140	0	140	X
	Mesa Two 4000	DCC-116		62	93	2/76	3	0	3	X
	Total						143	0	143	
Mercator Business Systems	4000	8086		22	23	10/80	15	50	65	200
	3000	8088		15	16	4/81	0	0	0	400
	Total						15	50	65	600
Microdata	Reality	Microdata 1600		32	60	12/73	2,650	510	3,160	NA
	Reality 2000	Microdata 1600		32	36	6/79	80	10	90	NA
	Reality 4000	Microdata 1600		38	50	6/79	410	60	470	NA
	Reality 6000	Microdata 1600		62	76	6/79	700	92	792	NA
	Reality 8000	Microdata 1600		85	95	2/80	212	40	252	NA
	Total						4,052	712	4,764	
Microstar, Inc.*	Microstar I	Zilog Z80		13	17	12/78	5	0	5	X
	Microstar II	Zilog Z80		14	19	12/78				X
Microtech Business Systems, Inc.	System 50	Point 4		14,950	30,000	/80				
	System 100	Point 4		19,500	22,500	/80				
	System 200	Point 4		24,500	29,500	/77	175	0	175	25
	System 300	Point 4		33,500	38,000	/79				
	System 400	Point 4		49,500	55,000	/78				
Mini-Computer Systems, Inc.	Micos 100	Nova 3/4		34	40	8/77	130	170	300	NA
	Micos 200	Nova 3/12		40	60	/73	935	415	1,350	NA
	Micos 300	Dual Nova 3/12		100	140	1/79	6	4	10	NA
	Micos 75	Nova 3/4		26	26	9/79	18	16	34	X
	Micos 85	Nova 3/4		36	41	/80	22	28	50	X
							1,111	633	1,744	
Minutemen Computer Corp.	1774	Nova 3/4, 4/5		30	40	11/71	70	0	70	
	1775	Nova 3/12, 4/16		32	44	3/72	40	0	40	50
	1776	Nova 3/12, 4/16		35	59	3/72	40	0	40	
	1776/A	Nova 3/12, 4/16		35	65	5/77	45	0	45	
	Total						195	0	195	
Moore Business Systems	MBS 20/50	DS 990/1		18	22	12/79	220	2	222	740
	MBS 20/80	ONYX C8001		19	25	9/80	22	0	22	180
	Total						242	2	244	920
Mylee Digital Sciences, Inc.	3000 Series	Mylee 3G		29	60	5/76	164	0	164	18
NCR Corp.	8130	NCR		19	23	3/78				
	8140	NCR		15	16	5/80	1,360	3,000	4,360	2,100
	8150	NCR		27	34	2/77				
	9020	NCR		NA	57	/81				
	9040	NCR		NA	96	/81	0	0	0	NA
	9050	NCR		NA	301	/81				
	8200	NCR		33	63	9/74				
	8230/31	NCR		27	42	6/77	6,640	7,200	13,840	4,500
	8250/51	NCR		29	60	12/76				
	Total						8,000	10,200	18,200	6,600
NEC (U.S. Only)	210	NEC		16	17	6/79	50	-	50	50
	230	NEC		24	40	6/79	300	-	300	300
	250	NEC		34	73	6/79	150	-	150	100
	Total						500	-	500	450
Nixdorf Computer Corp. (U.S. Only)	8870/1	8013, 8015		11	32	/78	250	-	250	115
	8870/3	8033, 8035		19	40	1/81	0	-	0	170
	Total						250	-	250	285
Norfield Datasystems, Inc.*	Nova-System	Nova		35	50	6/73	20	0	20	X
Novell Data Systems, Inc.	Nexus I	Nexus		12	12	4/81	0	0	0	350
	Nexus II	Nexus		25	25	6/81	0	0	0	150
	Total						0	0	0	500

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AS OF JANUARY 1, 1981

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ORDERS FOR 1981 INSTALLATION
Prodigy Systems, Inc.	Prodigy 1	Z80-A		13	15	5/79	120	30	150	NA
	Prodigy 2	Z80-A		14	18	6/80				NA
Programmed Control Corp.	Prophet 21/1	TI 960-B		42	75	/72	40	0	40	1
	Prophet 21/2	TI 990/10		57	100	1/78	35	2	37	18
	Total						75	2	77	19
Q1 Corp.	Q1/LMC	Z80, 8080		10	21	2/74	575	75	650	NA
	Q1/LITE	Z80		6	24	2/77	510	400	910	NA
	Q1 Microlite	Z80		10	13	1/79	220	300	520	NA
	Q1 68000	68000		15	30	/81	0	0	0	NA
	Total						1,305	775	2,080	
Qantel	210, 110	Q29		12	17	11/77	200	600	800	100
	800/900	Q7		28	29	5/75	85	62	147	X
	950	Q7		28	33	11/75	600	240	840	X
	960	Q7.5		30	35	11/76	300	100	400	X
	970	Q29B		36	40	1/79	250	150	400	X
	1200	Q7		42	59	11/75	200	20	220	X
	1300	Q7.5		42	59	11/75	40	15	55	X
	1400-2	Q7.5		44	70	5/77	360	170	530	X
	1450-2	Q29B		45	80	1/79	200	50	250	X
	200 Series	Q29B		30	57	3/80	425	125	550	NA
	300 Series	Q29B		50	86	3/80	105	30	135	NA
							2,765	1,562	4,327	
Quodata Corp. (Educomp)	F-250, 500	PDP-8		15	30	/72	280	60	340	X
	F-660, 760, 820, 960	PDP-11		44	100	/75				X
	Q-620, 720, 750, 820, 850, 970	PDP-11		40	120	/80				65
	QDP/78	PDP-8		13	13	/77				X
	ECS/7800	PDP-8		10	11	/77				X
Randal Data Systems*	R-100 Series	Randal		14	17	10/75	257	13	270	X
	R-200 Series	Randal		24	30	10/76	382	0	382	X
	R-300 Series	Nova 2/10		34	45	6/74	27	0	27	X
	R-400 Series	Nova 2/10		36	45	6/74				X
	R-500 Series	Randal		42	47	10/77	45	0	45	X
	Total						711	13	724	
Retail Sciences, Inc.	Clerk 700	PE 5/16		19	19	10/78	18	5	23	NA
	Clerk 800	PE 5/16		25	25	4/79	25	15	40	NA
	Total						43	20	63	
Rexon Business Machines	RX15	8086		20	22	2/81	0	0	0	300
	RX20	8086		27	43	7/79	105	105	210	250
	RX30	8086		23	28	4/80	75	75	150	250
	Total						180	180	360	800
Reynolds & Reynolds	VIM III	BTI 5000		30	45	/78	1,650	297	1,947	NA
	Expansion 6000	Z80		35	67	5/81	0	0	0	NA
	Total						1,650	297	1,947	
Sentinel Computer Corp.	Sentinel Series	8086		21	38	7/79	220	114	334	350
A.O. Smith*	Mesa Two	Nova 3		58	58	5/77	10	0	10	X
Space Byte Computer*	DBM/1	8085		6	13	7/78	55	10	65	X
	DBM/2	Z80		13	15	6/79	10	0	10	X
	Total						65	10	75	
Span Management Systems*	TSS 2	IBM Series/1		31	31	/77	10	3	13	X
Sperry Univac	BC-7	Univac		22	45	4/77	1,435	700	2,135	690
STC Systems, Inc.	Ultimacc 2000	Nova 3/12		34	80	9/72	108	2	110	X
	Ultimacc 3010	Nova 3/D		55	112	1/75	108	2	110	X
	Ultimacc 3080	Nova 3/D		84	143	11/75	25	0	25	X
	STC System 4000	Nova 4		35	80	11/76	75	0	75	20
	STC System 5000	Nova 4X		40	200	11/76	25	0	25	20
	Total						341	4	345	40
Symcro Systems, Inc.	SB700	Z80		25	30	2/81	0	0	0	NA
Tri-Star, Inc.*	TTK-10	Nova 3/12		45	55	2/76	12	0	12	X
	TEK-80	Nova 3/12		52	67	4/76	4	0	4	X
	Total						16	0	16	
Vanguard Computer Systems, Inc.	V400	Raytheon RDS 500		45	52	6/77	2	0	2	X
	V500	Raytheon RDS 500		65	85	3/76	6	3	9	NA
	Total						8	3	11	
Wang	2200	2200		10	19	4/73	12,910	8,505	21,415	340
	2200 VP	2200 VP		11	26	9/76	6,615	4,410	11,025	4,780
	2200 MVP	2200 MVP				1/78				
	VS	2200 VS		33	114	10/77	1,560	1,040	2,600	1,840
	2200 LVP	2200 LVP		13	25	9/80	210	140	350	320
	2200 SVP	2200 LVP		10	14	9/80				
	Total						21,295	14,095	35,390	7,280
Wintex Computer Corp.	200 MS	Wintex		12	18	1/75	95	1	96	X
	MT 200	Wintex		10	20	10/79	36	0	36	45
	Total						131	1	132	45
Zilog	MCZ 1/70	Z80		18	18	1/80	90	60	150	200
Total Of Above							137,461	89,874	227,335	
Total Other Vendors							2,300	600	2,900	
TOTAL							139,761	90,474	230,235	

Notes:

(a) Includes installations of Eldorado 140.
(b) Used Microdata processors until 11/76.
(c) Corporate name changed from Automated Business Concepts, March 1, 1980.
(d) Corporate name changed from Warrex Computer Corporation when it was purchased by Electric Data Systems, January 29, 1981.
(e) Design Data was acquired by Data General in February 1977.
(f) Digital Computer Controls was acquired by Data General in early 1977.
(g) Marketed in the U.S. by Shasta General Systems.
(h) Rental price $3,000/month.
(i) Computer hardware division purchased from Pick & Associates during 1980.
(j) U.S. installation figures account for retirements.
(k) Northrop Data Systems was acquired by Kalbro Corporation in 1981.
(*) Not currently active in manufacturing or marketing small business computers.
(NA) Data is not available.
(X) Model not in new production.

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DESKTOP COMPUTER CENSUS

The Desktop Computer Census counts those computers which typically are small enough to be used on a desktop, and are found in a variety of end-user enviornments including business, home, hobby, personal, educqtional, and scientific. By IDC definition the Desktop Computer is microprocessor based, includes its own power supply and enclosure, has the capability for attaching output peripherals -- video screen and/or printer -- and can also attach storage devices such as floppy diskettes, tape cassettes, or in some cases fixed disks. The computer is programmable in BASIC or equivalent level language, and costs from les than $1,000 up to $15,000 in a basic configuration. Microcomputer boards and kits are not counted here.

AS OF JANUARY 1, 1981

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	PURCHASE PRICE IN DOLLARS BASIC	PURCHASE PRICE IN DOLLARS AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ORDERS FOR 1981 INSTALLATION
Algorithmics, Inc.	Alga-2100	Z80	9,900	14,000	1/78	39	1	40	100
Altos Computer Systems	ACS 8000-2	Z80	4,500	5,000	6/77	1,200	2,200	3,400	3,000
	ACS 8000-5	Z80	5,990	7,000	10/79	350	350	700	2,000
	ACS 8000-6	Z80	9,500	10,450	11/79	1,000	1,000	2,000	4,000
	ACS 8000-10	Z80	8,500	9,000	3/81	0	0	0	3,000
	Total					2,550	3,550	6,100	12,000
A.M. Jacquard Systems	J500	A.M. Jacquard	12,000	16,000	12/78	510	770	1,280	1,080
APF Electronics	IM 1	6800	400	1,115	11/79	7,500	0	7,500	NA
	SBS-2	6800	-	1,200	2/81	0	0	0	NA
Apple	Apple II	6502	1,330	2,500	5/77	124,500	32,500	157,000	NA
	Apple III	6502	4,240	6,000	11/80	1,000	100	1,100	NA
	Total					125,500	32,600	158,100	
Applied Digital Data Systems, Inc.	Multivision I, II, III	8085A	3,700	12,800	12/80	100	100	200	NA
Archives Incorporated	Archives Business System	Z80	6,500	6,500	1/80	450	50	500	4,500
Artec Electronics Inc.	Artec System	8085 A-2	6,300	7,300	11/80	11	1	12	NA
Atari	400	6502	550	550	9/79	25,000	0	25,000	NA
	800	6502	1,000	1,000	9/79				NA
Billings Computer Company	BC12FD	Z80	6,600	9,500	3/79	650	950	1,600	NA
	BC12DF2M	Z80	9,900	12,900	3/79				NA
BRD, Inc.*	Small Fry	6800	7,000	10,000	4/79	50	0	50	X
Canon	BX-3	6809	5,600	5,600	5/81	0	-	0	800
(U.S. Only)	CX-1	6809	3,995	7,000	5/81	0	-	0	800
	Total					0	-	0	1,600
Columbia Data Products, Inc.	500	Dual Z80-A	3,000	3,995	9/79	460	52	512	1,800
	900	Dual Z80-A	4,100	4,995	9/79	122	73	195	
	MX	Z80-A	2,195	2,495	12/79	18	36	54	300
	FX	Z80-A	4,495	4,495	2/80	33	14	47	110
	Total					633	175	808	2,210
Commodore	PET/CBM	6502	795	995	10/77	90,400	106,600	197,000	100,000
	VIC 20	6502	299	400	6/81	0	0	0	75,000
	8096	6502	NA	NA	7/81	0	0	0	NA
	Total					90,400	106,600	197,000	
Compal	8100	8080	12,000	12,000	12/76	400	10	410	0
	8200	Z80	12,500	14,000	1/80	250	0	250	400
	Total					650	10	660	400
Compucorp	625	Z80	5,000	8,500	6/77	200	500	700	X
	655	Z80	5,000	7,000	4/79	1,000	2,000	3,000	NA
	665	Z80	5,000	7,000	4/79	500	1,000	1,500	NA
	675	Z80	8,000	10,000	6/79	200	500	700	NA
	685	Z80	13,000	15,000	5/81	0	0	0	NA
	Total					1,900	4,000	5,900	
Computer Data Systems*	Versatile 4	8085	3,800	4,500	11/77	700	150	850	X
	Versatile 3B	8085	4,900	5,500	11/77	250	50	300	X
	Total					950	200	1,150	
Computer Hardware, Inc. (Business Machines)	4800	CHI	8,850	10,500	4/81	0	0	0	20
Computer Interface Technology	Pense System	Microengine	5,295	8,000	11/79	400	355	755	700
Computhink, Inc.	Minimax	6502	6,950	6,950	1/80	200	400	600	700
	Eagle 32	6800	5,800	9,000	5/81	0	0	0	300
	Total					200	400	600	1,000
Cromenco	System Three	Z80-A	5,995	10,943	8/77	7,700	800	8,500	6,000
	System Zero/D	Z80-A	2,995	4,990	12/80				
	System Zero	Z80-A	995	2,990	12/80				
Cyber Systems, Inc.	CYKEY 9910	Z80	7,000	9,000	3/81	0	0	0	500
Diablo Systems, Inc.	3000	8085	15,000	17,000	12/79	450	550	1,000	NA
	510	8085	12,000	12,000	4/80	150	0	150	NA
	Total					600	550	1,150	
Digilog, Inc.	1000	Z80A	3,995	6,495	11/80	5	0	5	NA
	2000	Dual Z80-A	8,400	8,400	9/80	100	0	100	NA
	7120	Dual Z80-A	8,400	8,400	3/79	0	1,500	1,500	NA
	Total					105	1,500	1,605	

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AS OF JANUARY 1, 1981

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Digital Equipment Corp.	Mini MINC	LSI-11	9,900	11,000	10/79	2,000	500	2,500	2,800
	Datasystem 150	LSI-11	10,900	15,000	3/79	900	700	1,600	1,200
	Total					2,900	1,200	4,100	4,000
Digital Microsystems	DCS-2	Z80-A	4,995	5,895	11/77	5,000	2,000	7,000	20
	DCS-2585	Z80-A	9,950	9,950	6/78	300	0	300	12
	DSC-3	Z80-A	5,495	15,000	11/80	35	15	50	750
	DSC-4	Z80-A	6,950	10,000	10/80	30	15	45	600
	Total					5,365	2,030	7,395	1,382
Durango Systems	F85	8085	9,950	12,536	10/78	1,100	1,100	2,200	1,200
Dynabyte	5100	Z80	2,295	3,000	/78	1,500	600	2,100	110
	5200	Z80	4,495	5,000	/78	1,100	480	1,580	1,000
	5300	Z80	5,995	7,000	/79	310	110	420	750
	5400	Z80	6,995	8,500	/79	380	200	580	100
	5800	Z80	17,995	23,000	/80	80	45	125	100
	5900	Z80	18,995	25,000	/80	100	110	210	145
	5500	Z80	10,995	14,000	/81	0	0	0	340
	5600	Z80	11,995	15,000	/81	0	0	0	780
	5700	Z80	14,995	18,000	/81	0	0	0	1,165
	Total					3,470	1,545	5,015	4,490
Exidy Systems, Inc.	Sorcerer	Z80	1,295	2,200	8/78	7,000	7,000	14,000	8,000
	80/1	Z80	1,495	5,500	3/80				
	80/2	Z80	1,495	7,295	3/80				
Findex, Inc.	100	Z80	4,500	5,980	7/79	24	6	30	X
	128	Z80	8,230	8,980	/80	0	1	1	5
	234	Z80	6,980	8,500	1/80	170	300	470	1,505
	Total					194	307	501	1,510
General Robotjcs*	Polaris	LSI-11	13,000	13,000	4/78	0	100	100	X
Gnat Computers, Inc.	System 10	Z80-A, 8085	5,950	6,100	12/79	80	20	100	
	System 10M	Z80-A, 8085	6,950	7,000	10/80	40	10	50	700
	System 10H	Z80-A, 8085	NA	NA	7/81	0	0	0	
	Total					120	30	150	700
Heath	WH 89	Z80	2,295	2,500	8/79	270	30	300	NA
Hewlett-Packard	9830	HP	4,900	16,500	11/72	5,000	5,000	10,000	X
	9825	HP	5,900	10,900	1/76	9,470	16,830	26,300	8,450
	9835	HP	9,000	13,200	12/78	2,750	3,800	6,550	2,800
	9845	HP	12,000	28,800	11/77	8,200	11,900	20,100	8,800
	85	HP	3,250	3,550	1/80	5,150	5,150	10,300	31,250
	83	HP	2,250	2,550	1/81	0	0	0	NA
	Total					30,570	42,680	73,250	
IMSAI*	VDP-40	8085	5,300	5,300	/78	380	20	400	X
	VDP-80	8085	7,800	7,800	/77	670	130	800	X
	Total					1,050	150	1,200	
Industrial Microsystems	5000	8080, Z80	3,695	3,695	6/79	500	400	900	900
	8000	8080, Z80	5,295	5,295	6/79	900	900	1,800	1,400
	Total					1,400	1,300	2,700	2,300
Intelligent Systems	8051	8080A	3,650	4,200	/76	5,318	2,275	7,593	900
	8063	8080A	6,200	9,500	11/79				
	8300	8080A	5,795	7,000	7/80				
	8900	8080A	4,465	6,000	7/80				
	3621	8080A	3,300	3,300	7/79	130	60	190	X
	Compucolor 2	8080A	1,600	1,800	9/78	3,375	2,875	6,250	450
	3650	8080A	2,945	3,500	10/80	75	25	100	NA
	Total					8,898	5,235	14,133	
Interactive Computer Systems	MCM 900	2901	9,200	20,000	2/79	150	400	550	100
	MCM 800	Bipolar	8,600	17,000	1/77	50	150	200	X
	MCM 700	8008	7,200	12,000	3/75	50	250	300	X
	Total					250	800	1,050	100
IBM	5100	IBM	6,300	13,000	11/75	4,300	1,000	5,300	X
	5110	IBM	9,900	17,000	2/78	13,500	2,600	16,100	NA
	5120	IBM	9,340	15,000	2/80	5,000	1,100	6,100	NA
	Total					22,800	4,700	27,500	
Intertec Data Systems	Super Brain	Z80-A	2,995	2,995	10/79	6,650	3,350	10,000	18,000
	Super Brain QD	Z80-A	3,995	3,995	4/80				
	Compustar	Z80-A	2,500	3,500	1/81	0	0	0	10,000
	Total					6,650	3,350	10,000	28,000
Konix International Corp.	System 80	Z80	3,700	4,000	6/78	53	14	67	X
	System 81	Z80	3,700	4,100	1/80	18	1	19	X
	Total					71	15	86	
Micro V Coporation	Microstar I	8085A	7,500	15,000	8/78	900	900	1,800	NA
	Microstar II	8086	12,000	25,000	9/80	100	100	200	NA
	Series 3000	8086	18,000	24,000	5/81	0	0	0	800
	Total					1,000	1,000	2,000	
Micromation	System 100	Z80	2,930	9,500	1/80	125	15	140	100
	System 200	Z80	12,000	14,000	1/80	30	0	30	125
	Total					155	15	170	225
Midwest Scientific	MSI-6800 AW	6800	5,000	6,000	5/79	500	650	1,150	1,200
Morrow Designs	Decision I	Z80	5,000	7,500	4/81	0	0	0	80
NCR	7500	NCR	7,500	9,500	/79	1,000	2,000	3,000	NA
NEC Information Systems (U.S. Only)	205	NEC	8,560	13,350	7/80	180	-	180	450
NNC Electronics	80	Z80	4,450	4,450	2/80	100	100	200	400
	80W	Z80	7,650	7,650	11/80	15	15	30	200
	Total					115	115	230	600
North Atlantic Industries	SBC-1 Shoebox	LSI-11/2	1,980	1,980	1/81	0	0	0	NA
North Star Computers	Horizon	Z80-A	2,695	3,350	12/77	16,400	3,600	20,000	1,200
Northwest Microcomputers*	IVMS 85/P	8085	7,200	7,200	1/78	25	3	28	X
Odell Industries*	System 85	8085A	10,450	15,550	6/78	30	0	30	X
Ohio Scientific	Challenger	6502/6800	1,260	4,500	/78	6,450	650	7,100	NA

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DESKTOP COMPUTER - (Continued)

AS OF JANUARY 1, 1981

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	PURCHASE PRICE IN DOLLARS BASIC	PURCHASE PRICE IN DOLLARS AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ORDERS FOR 1981 INSTALLATION
Olivetti	P-6060	Olivetti	13,000	13,000	/77	1,000	-	1,000	X
(U.S. Only)	P-6066	Olivetti	11,600	11,600	3/81	0	-	0	700
	Total					1,000	-	1,000	700
Panasonic Co.	JD 850	8085	10,500	11,500	6/80	12	-	12	NA
(U.S. Only)	JD 740	8085	7,000	9,500	/81	0	-	0	NA
	JD 800	8085	8,000	9,000	/81	0	-	0	NA
	Total					12	-	12	
Pertec Computer Corporation	PCC 2000	8085A	9,995	13,120	9/78	1,069	965	2,034	1,300
	MITS 300/25/55	8080	8,080	13,800	/77	1,100	175	1,275	X
	Total					2,169	1,140	3,309	1,300
Polymorphic Systems	8813	8080	4,700	5,870	9/77	2,500	400	2,900	NA
	Twin Systems	8080	6,000	7,500	7/80	40	10	50	NA
	Total					2,540	410	2,950	
Processor Industry*	Sol I,II,III,IV	8080A	3,000	6,000	/77	4,500	500	5,000	X
Psytek, Inc.	Psytek 770	Z80	4,750	7,200	7/79	30	5	35	45
Quay Corporation	Quay 900,900/33	Z80	5,995	5,995	9/79	] 450	] 20	] 470	NA
	Quay 500	Z80	2,995	2,995	3/80				NA
	Quay 520	Z80	3,495	3,495	3/80				NA
	Total								NA
R2E of America	80/30	Z80	5,000	7,000	7/79	5	-	5	NA
(U.S. Only)	80/40	Z80	7,000	8,000	7/76	20	-	20	NA
	80/21	Z80	4,000	4,000	9/79	0	-	0	NA
	X Product	Z80	5,500	5,500	1/79	50	-	50	NA
	80/50	Z80	12,000	15,000	7/75	5	-	5	X
	Total					80	-	80	
Retail Sciences	Clerk 300	Z80	12,000	12,000	8/79	85	50	135	NA
Scientific Data Systems, Inc.	SDS 420 Series	6502	8,400	8,400	3/79	185	15	200	100
S.D. Systems	SDS 100	Z80	6,995	6,995	4/78	200	65	265	NA
	SDS 200	Z80	8,905	8,995	5/77	250	75	325	NA
	SDS 700	Z80	19,500	19,500	9/80	35	15	50	NA
	SDS 605	Z80	12,500	12,500	2/81	0	0	0	NA
	SDS 610	Z80	14,000	14,000	2/81	0	0	0	NA
	Total					485	155	640	
Sharp Electronics Corporation (U.S. Only)	YX-3200	Z80	5,975	5,975	5/81	0	0	0	NA
Smoke Signal Broadcasting	Chieftan	6800	2,595	3,000	3/79	400	125	525	50
	Chieftan	6809	2,695	3,100	3/80	250	150	400	500
	Total					650	275	925	550
Solid State Technology	8185	8085A	6,000	10,000	12/79	1,250	1,100	2,350	3,000
Systel Computers, Inc.	Model 11	8085, Z80	8,950	8,950	1/81	0	0	0	700
	Model 15	8085, Z80	9,950	9,950	1/81	0	0	0	1,400
Tandy Radio Shack	TRS-80/1	Z80	499	1,000		220,500	24,500	245,000	NA
	TRS-80/11	Z80	3,450	6,500		18,500	1,500	20,000	NA
	TRS-80/111	Z80	700	2,000		2,900	100	3,000	NA
	TRS-80 Color	Z80	399	399		1,900	100	2,000	NA
	Total					243,800	26,200	270,000	
Tano Corporation	Outpost 11	6800	4,995	5,575	8/78	890	110	1,000	700
	Outpost 7	6800	3,000	4,000	8/77	180	20	200	X
	Total					1,070	130	1,200	700
Tektronix	4051	6800	5,995	17,000	12/75	8,280	4,420	12,700	NA
	4052	Tek	10,950	16,500	7/79	) 1,820	) 980	) 2,800	NA
	4054	Tek	19,140	24,500	7/79				NA
	Total					10,100	5,400	15,500	
Texas Instruments	99/4	TI9900	650	1,000	11/79	13,900	100	14,000	NA
Vector Graphics	System B, MZ	Z80	4,313	5,400	1/79	5,700	1,900	7,600	NA
	Memorite	Z80	8,950	8,950	1/79	300	100	400	X
	VIP	Z80	3,695	3,695	8/80	255	80	335	NA
	2800	Z80	7,295	7,295	7/80	150	50	200	NA
	3030	Z80	11,945	11,945	1/80	50	0	50	NA
	3005	Z80	7,950	7,950	3/81	0	0	0	NA
	2600	Z80	5,695	5,695	3/81	0	0	0	NA
	Total					6,455	2,130	8,585	
Wang	PCS 1	Wang 2200	5,400	8,000	4/76	840	320	1,160	X
	PCS 2	Wang 2200	4,800	10,145	4/77	2,950	1,900	4,850	X
	PCS 3	Wang 2200	6,500	9,000	4/80	25	10	35	
	Total					3,815	2,230	6,045	
Wave Mate	Series 2000	6800	2,395	3,000	1/79	100	100	200	NA
Zeda Computers International	Zeda 580	Z80	6,038	6,250	6/79	275	25	300	2,500
	Zeda 520	Z80	3,995	3,995	2/81	0	0	0	300
	Total					275	25	300	2,800
Zenith	Z89	Z80	2,895	2,895	10/79	2,700	300	3,000	2,000
Zilog	MCZ1	Z80	8,000	9,500	/77	1,300	1,100	2,400	1,200
	MCZ2	Z80	11,500	11,500	6/80	150	50	200	1,000
	Total					1,450	1,150	2,600	2,200
Total Of Above						680,962	273,652	954,614	
Total Other Vendors						2,000	0	2,000	
TOTAL						682,962	273,652	956,614	

Notes

*) Not currently active in manufacturing or marketing desktop computers.
NA) Data is not available.
X) Model not in new production.

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JUN 0 9 1981

EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"The Gray Sheet"

MOLLY UPTON, EDITOR MAY 27, 1981 ● VOL.17,NO.1 P.J.McGOVERN,PUBLISHER

4300 IMPACT CAUSES IBM 360 BASE TO DWINDLE AT LAST AND 370 BASE WANES

Summertime, and it looks as if IBM is foregoing product announcements temporarily in order to give users a chance to digest its big push toward the newer variations of MVS.

Prompted by confirmed reports that early delivery schedules of the newest behemoth, the 3081, are commanding unbelievable premiums, and rumors that IBM would like to implement a volume discount plan for 4300s, EDP/IR takes a look at International Data Corporation's latest user migration study to see how the IBM base is churning.

(Users with early deliveries sold their positions for as much as $350,000 and $500,000, but those asking $750,000 and $1 million were still asking.)

The IBM migration picture is really no surprise; the 4300s are helping eradicate the remainder of the 360 base and shrink the small and medium end of the 370 base. The 303X series is replacing the upper end of the 370.

Users should expect that IBM is changing its game plan. Look for faster product turnover, made possible by a larger percentage of the base on purchase rather than lease, and more rapid product development resulting from advances in technology. The Giant probably does not want to repeat the duration of the 360 series -- now 16 years. EDP/IR expects these future IBM trends:

- More encouragement of purchase rather than lease.
- More frequent product introductions.
- Quantum increase in number of enhancements -- all costing $.

IBM apparently has decided it likes selling systems as a means of generating revenues. But as the proportion of its base on lease declines, it needs to smooth out the profit blips that have occurred in the past in conjunction with popular years of certain models. This means more frequent temptations to users' pocketbooks, in both hardware and software forms. Software revenues will play an increasingly important role in vendors' revenue plans. Further unbundling may help vendors to lower hardware purchase prices.

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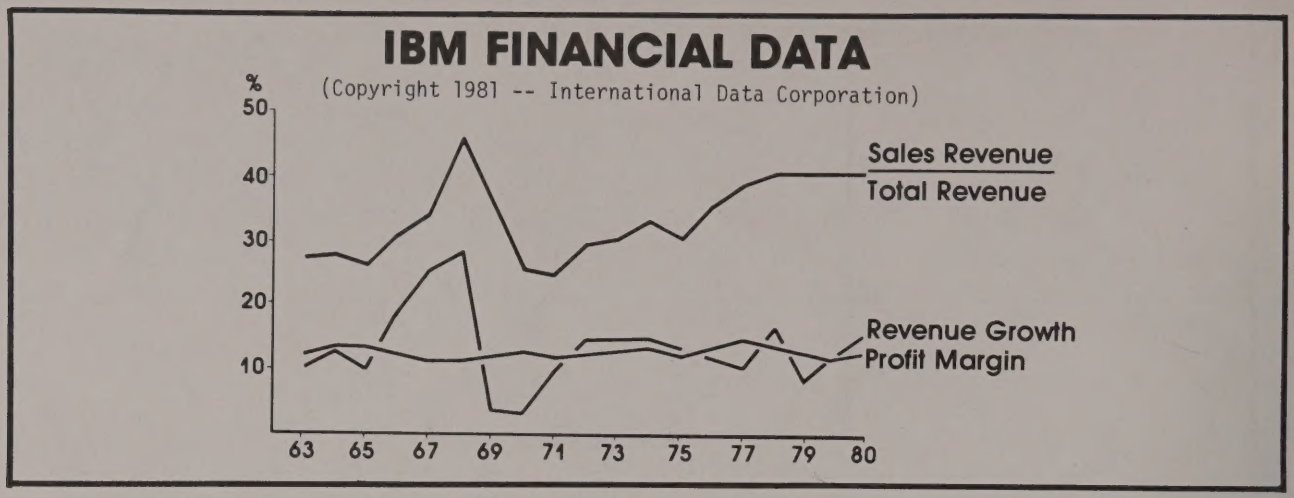
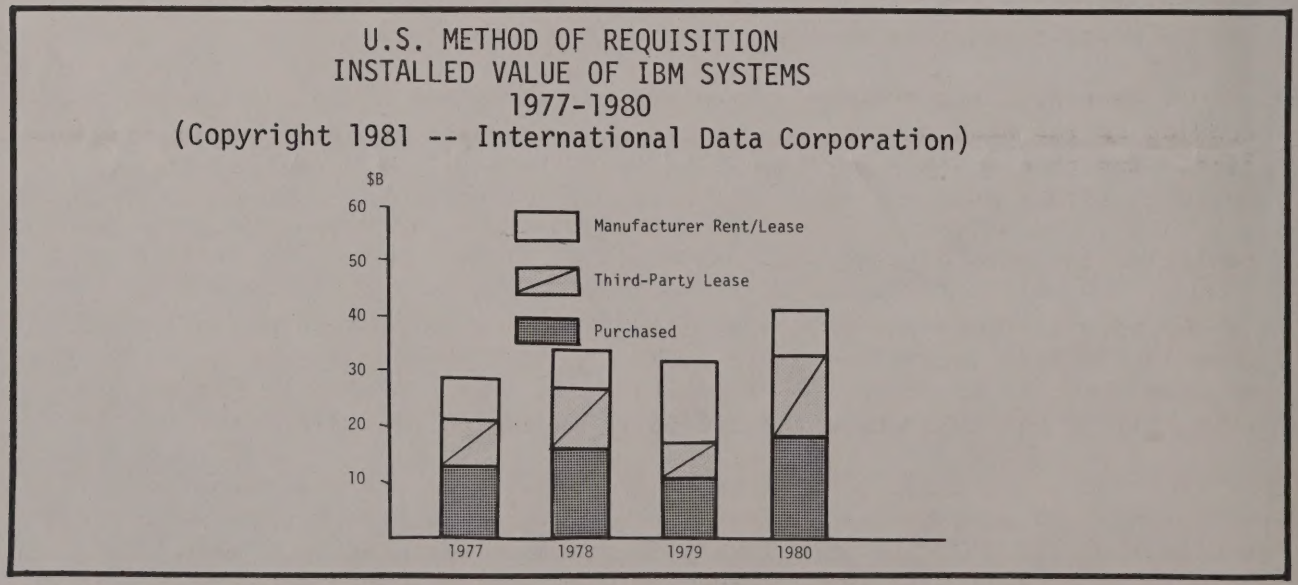


Throughout the general purpose sector, the tight money in 1980 helped third party lessors, and users showed a resurgence of leasing vs. purchase. Despite 1980, the overall trend to purchase is already evident in the ratio of purchase to lease systems within the 303X base compared with the 370 base after the identical number of years following introduction. And certainly the 3033S, which is upgradable (at a price) to the largest 3033, was introduced with the lowest lease/purchase ratio in recent memory.

Looking at the world from the IBM's view as a manufacturer, adding the third party lease base into the purchased base, between 1979 and 1980 the value of the manufacturer's lease base in the U.S. was cut in half, while the purchase base nearly doubled.

3033 shipment shortfall

Comparing users' migration plans in 1979 with those of 1980, IDC found that deliveries of 3033s did not meet expectations. In addition to the obvious impediments of tight money and users' jitters anticipating a better price/performance ratio for the 3081, IBM apparently caused longer delivery times by shutting down at least one 3033 production line, retooling for the



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RESIDUAL VALUES OF IBM SYSTEMS

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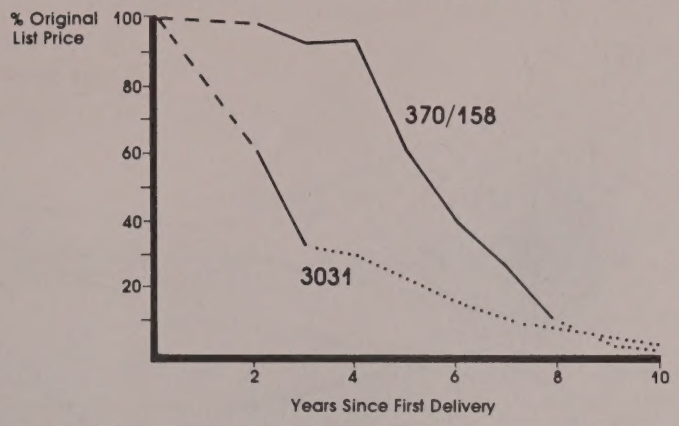

3081. By late 1980, the lead time for a 3033 had stretched to nine months, up from six months in the summer and three months prior to that.

However, 4300 shipments during the year exceeded IDC's expectations, with mid range 370s moving more quickly to the 4300s than the surveys had indicated. IBM's worldwide shipment value rose by 12% -- coincidentally the same rate as worldwide shipments of general purpose computers by U.S. makers -- as 4300s and fairly high shipments of System/38s easily offset the 3033 shortfall.

Paul Arabasz, IDC manager of industry analysis, notes "IBM kept 3033 shipments at a relatively low level as part of an overall attempt to grow shipments at a controlled, steady rate -- rather than in the spurts of the past."

Residual values

Trend lines of residual values of IBM gear will change dramatically as a result of the push toward purchase activity. For instance, the 370/158 line is an example of how residual values held up prior to the purchase-oriented strategy. There were no purchase price cuts during its active life, and in fact there were some price hikes. The gear held at above 90% of original list for the first several years. The first price cut was about 30% at the end of its life and since then used prices have declined rapidly.

In contrast, the 3031 line shows that IBM cut the price even before it was trading on the used market, so the first trades were at about 60% of original list. And then another purchase cut a year later, last November, dropped residual values even further. The dotted lines portray expected patterns.

Declining 360, 370 populations

No surprise that the 360s will dwindle from about 20% of the total IBM base in the U.S. in 1979 to 8% in 1982. The 360/30, 40, 50 and 65 will shrink to less than 30% of their 1978 installations. The /30 and /40 are migrating primarily to the 4331 while the 360/65 is moving to the 4341.

The 370 base, taken as a whole, will shrink from 44% in 1980 when the 4300s began to show up in considerable quantities to 16% in 1982. Generally the smaller the 370, the more likely it is to be replaced by a 4300. The 370/148 is showing relatively strong life as smaller users often select it as

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U.S. INSTALLED BASE OF IBM SYSTEMS (DPD)
1978 - 1982
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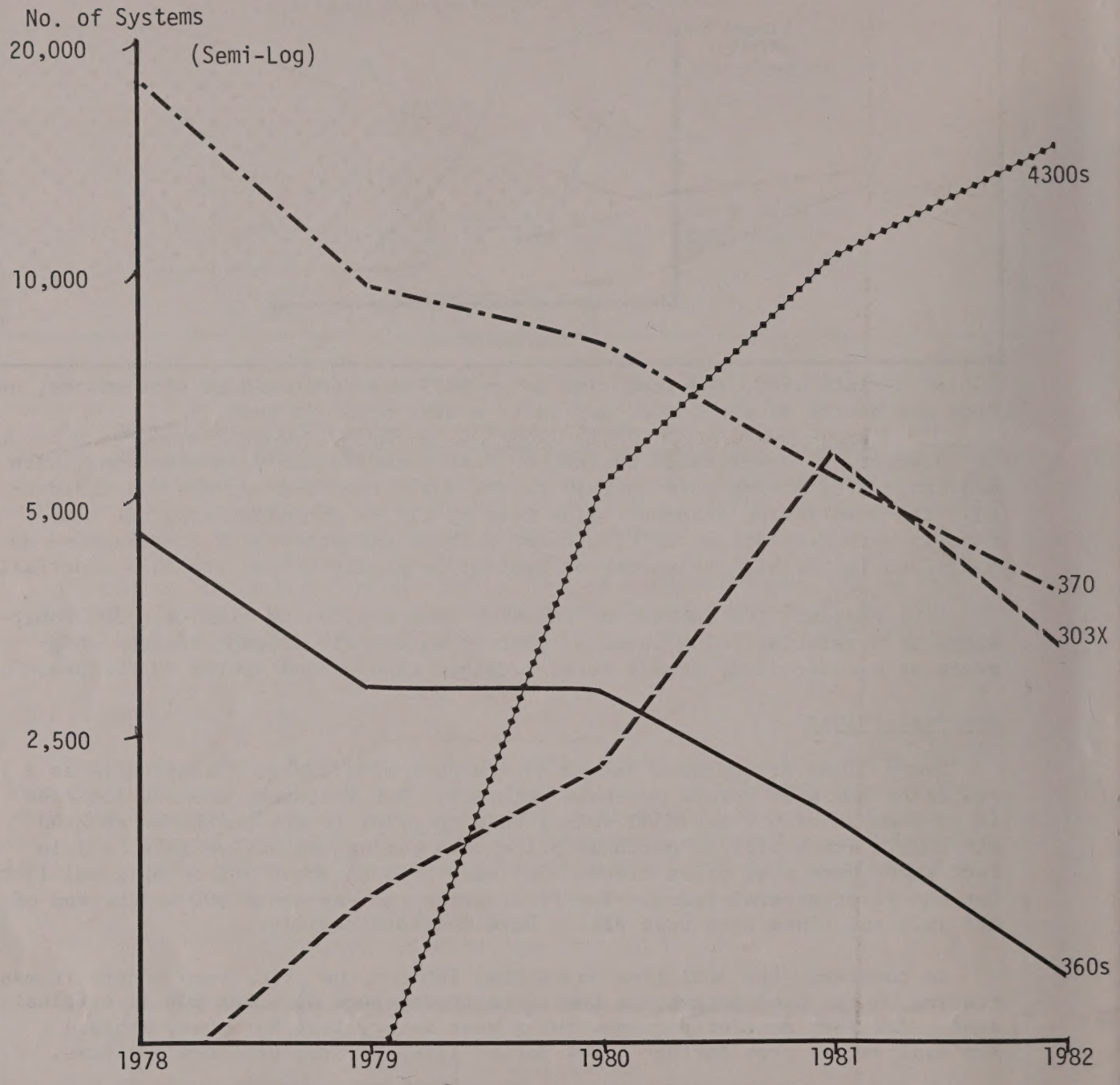

an upgrade. Its base in 1982 should be about 44% of that in 1978, whereas the 138 base will be only about 33% of that in 1978.

The 155/165 populations aren't changing much as their users are generally slow growing. The 158 will be around, as it, like the 148, is an upgrade favorite. However, by 1982 the 3033S should have made a sizeable erosion into its base. And the 168, which has also been a popular upgrade, faces severe competition from the 3033S, which is upgradeable, and about the same price tag.

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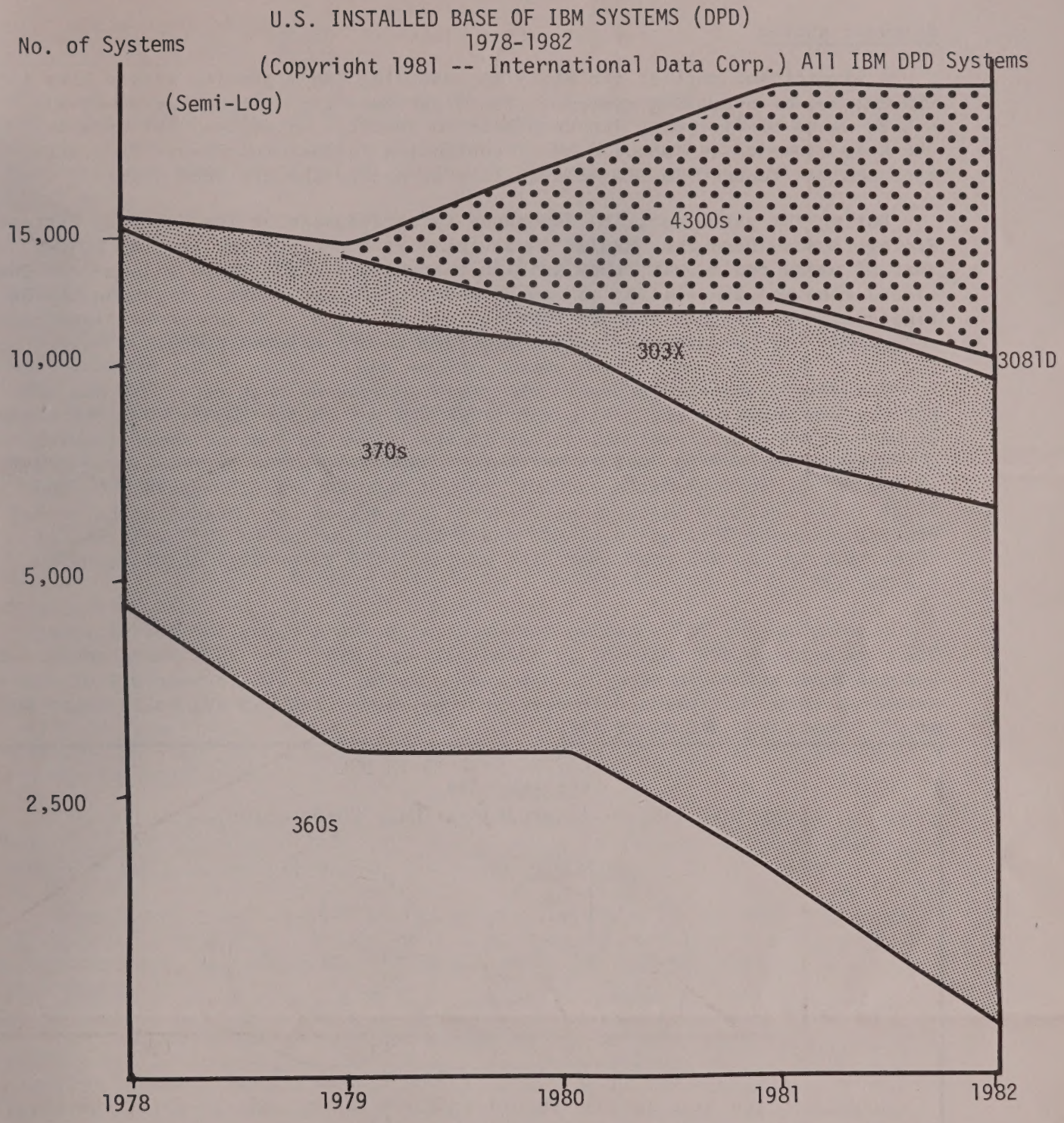

The predicted popularity of 4300s is a force to be reckoned with. For instance, by 1982 there will be more of the announced four models installed than there were 370s at their heyday in 1978, and nearly as many as the number of 370s and 360s combined in 1978.

The 303X series U.S. base will peak in 1981 and number about half of the installed 370 base in 1978. Considering the incremental power in each 303X, that's a lot of horsepower.

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Software shoves

A significant part of the story in examining IBM migration trends lies in the choices of operating systems. The Giant uses its software as a not-so-subtle means of directing its user base to specific hardware. For example, the whip approach is embodied by discontinuing further releases. The carrot approach can be seen in MVS/SP's ability to handle the new 3880 disks.

During the past year, IBM announced three releases of its Multiple Virtual Storage/System Products; MVS/SP 3 has the most functionality and IBM hinted that if users could wait, they shouldn't bother to fiddle with release 2. The 4341-2 received the ability to run VM and MVS/SP concurrently by using the Extended Control Program Support feature. In addition, IBM announced distributed systems license options (volume pricing) to MVS related products.

IBM simultaneously increased the range of systems that offer MVS and DOS. MVS was announced on the 4341 and DOS/VSE was put on the 3033S. But MVS alone is on the 3081, thus indicating that if one is really serious about growing all the way to the top, MVS is the path. However, in the short term, DOS/VSE on the 3033S, an upgradable machine, should lure several 370 users into the 3033S fold. Perhaps an example of users' intentions to upgrade is the marked transition among 3031 users to MVS and MVS/SE. Whereas in 1979 only 14% of these systems had MVS type operating systems, the percentage should grow to 61% in 1981.

Looking at the 303X family, respondents to IDC's migration survey showed 25% were running MVS in 1978; in 1979, 53% used MVS. The 3032 users accounted for the most marked increase in MVS use, jumping from 25% to over 61% of those surveyed. The 3031 users were also in tune, about 20% had MVS while about 90% of 3033 users had MVS as of 1979.

IBM OPERATING SYSTEMS IN USE
YEAREND 1979
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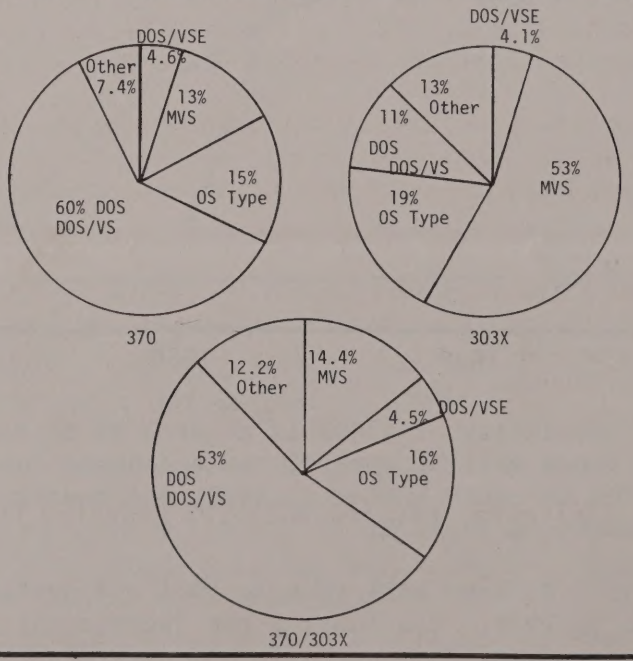

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MINI OEM ORDER REPORTS VARY FROM GLUM TO BUSINESS AS USUAL

While at least one vendor, Microdata Corp., has indicated it is no longer pursuing OEM sales, other mini vendors generally report a grim picture in that arena. However, many hasten to add that inventories have got to be the trimmest ever and that there should be pent up demand that springs loose -- hopefully soon.

High interest rates and the prospect that Reagan's administration may actually do something with tax incentives for capital equipment were cited as factors dampening the market.

Usually the U.S. and Europe manage to see-saw in and out of a slump, and the two avoid hitting the bottom of the trough at the same time. However, it looks like 1981 could be different -- European orders are down and the U.S. economy hasn't recovered to any major degree. The classical national-type economic remedies are still being hotly pursued regardless of the fact that much of the cause of the recession is global in nature, namely the control of oil prices by the Middle East.

While the DP industry has been known to be relatively sheltered from the economy, it remains to be seen whether it can sail through this one as unaffected as in the past. Traditionally, the minicomputer OEM market has been regarded as a bellwether in this regard.

Comments garnered at the recent National Computer Conference generally depict a long-standing slump. Data General observed that its OEM business has been flat for a year, although it characterized North America's position as a "positive flat" while European business is off substantially. Univac's Varian Division reported that business doesn't seem to be down but orders are definitely harder to get.

Computer Automation doubts if business has hit bottom yet, although the OEM division orders have been soft for a year. CA further observed that there can be no more inventory left in customers' pipelines.

HP reported that the downturn in OEM orders began in May 1979 but domestic orders are up from those a year ago and it appears as if the turning point is past. However, Europe has lagged somewhat and the traditionally soft summer lies ahead.

Perkin-Elmer said its best OEM market is the military, which is doing relatively well. However, in the low end, it is phasing out of the 16-bit OEM arena and plans a low end 32-bit system in the fall. The percentage of business PE does with OEMs has been rising to 65% of its total business in the U.S., while abroad the OEM business has been falling as indigenous suppliers get the nod.

Prime Computer indicated that its activity courting the systems builder has resulted in a higher percentage of business to that sector than a year ago and expects that pent up demand will increase business.

DEC cited strength in its traditional markets, particularly the OEM sector, and third quarter revenues rose 34% over the year ago quarter.

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• OOPS. XEROX CANS XTEN PLANS and cites $30 million plowed into the project that was a bit tentative from the start. Industry observers say Xerox plunged into Xten, a plan using cellular radio for short haul transmission, without doing much market research. A Xerox announcement indicated the concept is "technically feasible, but that the economics, for Xerox, are not." It cited other projects for Xerox' resources, plus the high investment required. Xerox said it plans no further investment in Xten but added that most of the costs had been expensed as incurred and would not materially affect earnings. The kiss of death most likely came shortly after Xerox originally announced the scheme when someone in corporate decided to haul the techies from Silicon Valley back East to Stamford, Conn., of all places, where corporate could "conduct" the project. Needless to say, the brains and the guts of the project departed in droves.

• HONEYWELL EQUIPS SMALLER SYSTEMS WITH MANUFACTURING PACKAGES. The HMS/6 runs on the DPS 6/54 and is designed for the single-plant manufacturer as well as for larger firms wanting discrete manufacturing systems that can share a common database with a host. The software integrates both inventory and production control into a single database. The cost for the six modules is $40,000 plus annual license fee of $10,650.

• INTEL PRICES DROP ON SOME CHIPS ... are Ethernet connections next? Although the world may be currently wooed with its 432 chip set for a 32-bit system, Intel is pumping out 8 bit chips and just cut the price of its 8088 by 60% and promised other price cuts will follow. An 8088 now sells for $20 in lots of 100. And the 8089 I/O processor chip received a 50% price cut to $68 for the same quantity. Intel has never been known to keep the prices high when they could be lower. Its conscience may get the upper hand and it may decide to reduce prices on its Ethernet interface units, which are forefathers of the chip sets. Apparently interest and orders at NCC were so great that Intel is considering setting up a production line, in which case the original high prices, based on onesie twosi assembly, are a bit hard on the conscience.

• XEROX, MEANTIME, SIGNS Ungermann-Bass to make its communications servers, known as the 872 and 873. These systems will allow non-Xerox units and the Xerox 860s to exchange information with Xerox devices connected to Ethernet. Ungermann-Bass is marketing an Ethernet-compatible Net/One local net.

• PENNY A BYTE is the price HP is charging for memory on its 1000 L series of microcomputers. HP cited use of 64K RAMs as responsible for the 60% price cut. Traditionally, HP's annual memory price cut has been about 30%.

• TALKING CHECKOUT STANDS are next in the industry's sporadic attempt to replace human courtesy and service with functions handled by a machine. In this era of large supermarkets, clerks rarely call customers by name and now, with the emphasis on speed, rarely call out the prices of items. But National Semiconductor's "positalker" point of sale scanning system has a home-grown speech synthesis chip that will call out prices.

• CORRECTION -- Part of the 20% increase in user spending during 1981 will result from increased rental or lease payments to manufacturers, which should jump 23% from $6.7 billion in 1980 to $8.3 billion in 1981 (EDP/IR, March 24).

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